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08 Tablets For Students

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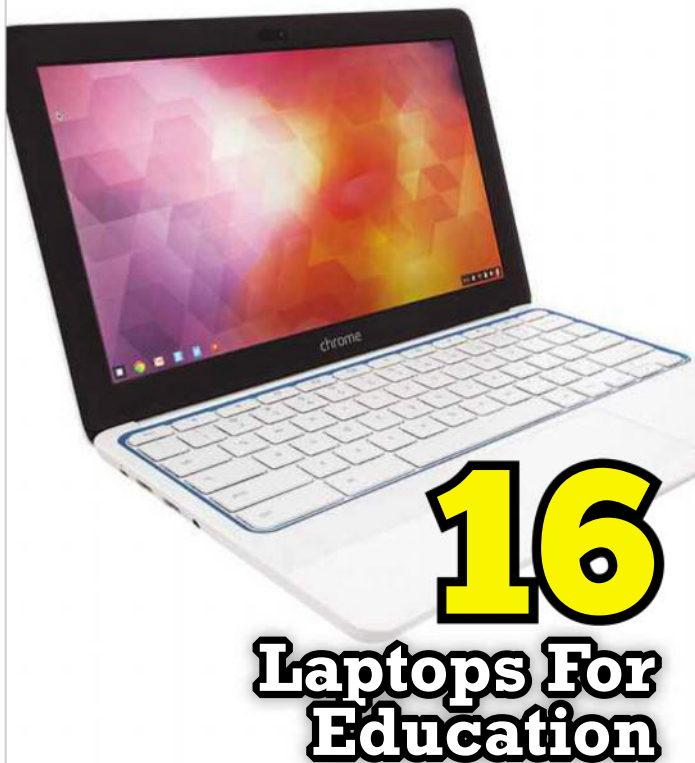
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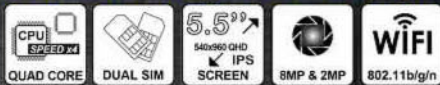
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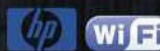


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The Best Tablets For Education

As the tablet market has matured, so has the range of things you can do with them

Over the past few years, tablets have gone from being an expensive luxury to a practical necessity for virtually any student trying to set themselves up with a versatile and compact device that can be used for work and leisure. Indeed, when paired with a Bluetooth keyboard most modern tablets might even be able to replace a laptop entirely – as long as you have a computer lab nearby for running the kind of ancient, Windows-only software packages universities like to throw at you.

Still, essential as they might be, picking a tablet can be difficult – and when you're buying one as a student, the things you have to consider may not be the same as when you are buying one more casually. To try and help you with your decision, we've looked at some of the most popular tablet and mini-tablet devices and tried to answer the question: what would a student want with this?

Mini-tablets

If a device has a screen size around 8" inches or less, it counts as a mini-tablet. 7" devices have been around for a few years now and have become the most popular size for budget tablets, which gives anyone looking to buy one a lot of

choice. The market for mini-tablets is also much wider than the market for full-size examples. Partly that's because Apple's dominance doesn't extend all the way down to this end of the market, but it's also because you get both super-cheap and luxury devices.

In terms of what they can offer students, the benefits of mini-tablets are considerable. Primarily, they're cheaper,

but they're also more portable, discreet and compact; this makes them easier to deal with in the limited space of a lecture hall. The only real disadvantages are their low power, which could make them slow to work with, and the fact that the small screen makes them harder to write on even with a keyboard. Rather than buying a mini-tablet instead of a laptop, you're more likely to buy one alongside it.



Tesco Hudl 2

The original Hudl was a surprise hit, and the late-2014 refresh – the Hudl 2 – has proven just as popular. Now an 8.3" device with 2GB of RAM and 16GB of internal storage, it retains the qualities that made the original so good.

Running on Android 4.4 (KitKat) and with a 1.83GHz Intel Atom CPU, it's got hardware and software to rival any tablet in its price range. The screen has been bumped up to a full HD (1920 x 1200) and the cameras are now 5MP on the rear and 1.2MP on the front. Connectivity includes Micro-HDMI, Micro-USB, MicroSD slot and Bluetooth/Wireless N.

Perhaps the most attractive thing about the Hudl 2 is its price. Now that it's getting on a little the tablet has shed £30 off its price, putting it at just £99. The only major disadvantage – aside from the complete lack of cool the brand exemplifies – is the lack of storage space, but that's easily boosted by an SD card. There's also close

“ In terms of what they can offer students, the benefits of mini-tablets are considerable ”

integration with Tesco's other services, which could prove useful to students, from Blinkbox integration to a suite of shopping and banking apps that can help manage your financial (and food) supply.

Despite all this, the Hudl 2's modest specs mean it isn't much good for gaming or working on – but whether you're playing music, watching a movie, reading Facebook or doing some online shopping, it's got all the capabilities of a larger, more expensive tablet apart from the inflated pricetag. Enthusiasts will doubtlessly want more out of their hardware, but if you're after a device that can give you portable entertainment and browsing at a low cost, it's ideal.

Amazon Fire HDX

The tablet formerly known as the Kindle Fire was refreshed in September 2014, so students beware: if you buy one in August you might end up buying last year's model just weeks before a new one drops. Or it might be another six months until that happens. Such is the risk inherent in buying within the rapidly turned-over tablet market.

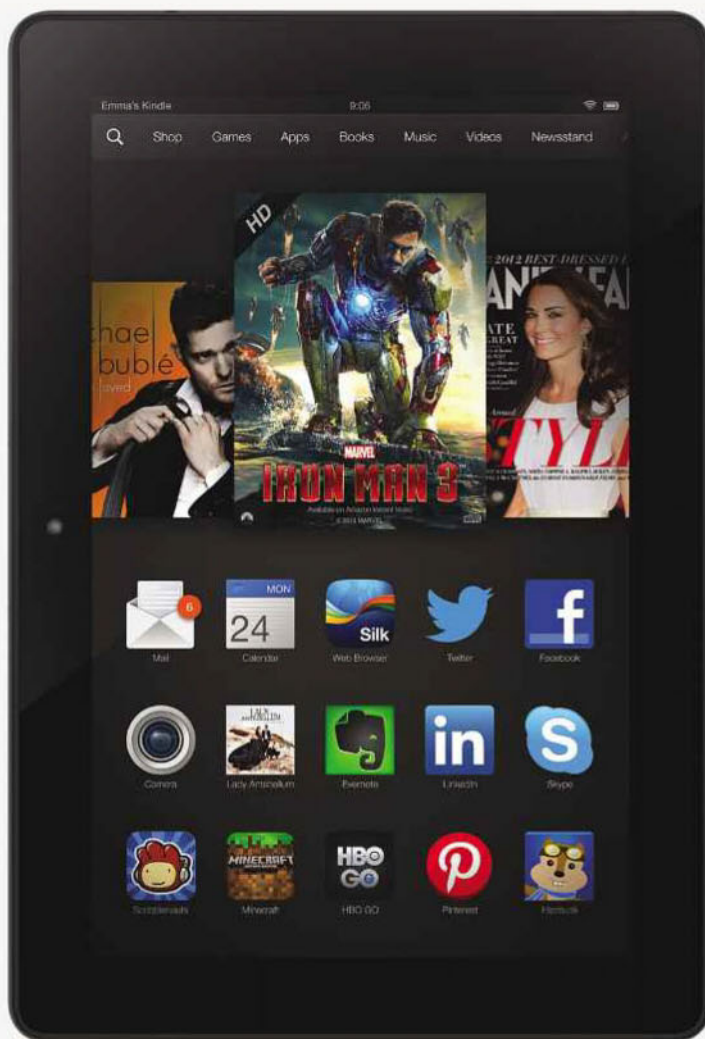
Still, the latest version of the Fire HDX – an 8.9" screen with improved 2.5GHz Snapdragon 805 GPU and CPU over the 2013 7" and 8.9" models – is pretty good. The operating system, as ever, is a modified version of Android known as Fire OS. The screen is a retina-style 2560 x 1600 pixel display, while the rear camera is 8MP (with flash) and the front-facing camera is 1.2MP. Perks include Amazon's 'mayday' help feature and Wireless AC networking. The biggest down-side is that you can't access the Google Play store – only Amazon's Appstore.

Compared to the Hudl, the qualities that matter most are a 30% longer battery life and 100g lighter weight. It's also available with 4G and higher capacity storage – you can buy it in 16GB, 32GB and 64GB models. Of course, these bells and whistles quickly stack up financially. The cheapest version is £329, the 4G version with 64GB storage is £449 – though you can save £10 by going for the advertising-supported home screen.

At these prices it's almost operating on the level of the iPad Air and its cohorts, which explains its larger display – even if 8.9" is more netbook than laptop. Despite this, the restrictive software selection and non-standard OS make it hard to use for working on. As a leisure device it's great, but laptop-class prices need to bring laptop-class performance, and that's sadly not the case here.

iPad Mini

To make matters confusing, Apple has two iPad Mini models. The cheaper of the pair, the iPad Mini 2, is priced at £239 for the 16GB wi-fi model. It's also the cheapest iPad that Apple sells. It's now a couple of years old and has been superseded by the more powerful, more expensive





iPad Mini 3, which starts at £319 for the 16GB model. Both have screens of 7.9", so they're smaller than the Fire HDX, but certainly within its class.

The retina display has a resolution of (2048 x 1536) and in terms of appearance, it's easily the best screen you'll find in a mini-tablet. The 64-bit Apple A7 CPU is surprisingly powerful too. Larger storage capacities are available up to 128GB, but are prohibitively expensive – £479 without 4G, and £579 with it. If connectivity is an issue, the Fire HDX suddenly looks a lot more attractive.

Still, the iPad Mini 3 isn't a bad investment for those who want a small tablet for practical rather than financial reasons – but if you want good value, it's hard to recommend. The mini-tablet form is mainly attractive because of its ability to offer significantly lower prices, and if you're not bothered about low prices then you can get an original iPad Air of equal capacity, similar capability and significantly larger screen for very similar pricing.

Access to the astonishingly great iTunes U (a selection of free University-level lectures and textbooks) aside, the only reason you might want to go with an iPad Mini over any other mini-tablet is if you've already got an iPhone and want your apps and content to sync without any difficulty. If you think that's worth spending the extra money, fair enough – and if the screen size isn't great for working on, at least the software on Apple's ecosystem is second-to-none.

Full-size Tablets

Any tablet 9" or larger can be considered a 'full-size' device. Their size, cost and greater performance capabilities tends to mean that these tablets are bought

instead of, rather than in addition to a notebook PC, but it also means they're a lot less common than smaller tablets, which are made much cheaper by trading off a little screen real estate.

In an educational context, full-size tablets are mostly useful because you can do your work on them. Combine them with a Bluetooth keyboard and you essentially have a system that competes with notebooks in a fraction of the space, and with a lot more versatility.

iPad Air 2

Apple's flagship tablet is due a refresh as early as September, so as with the Fire HDX now isn't necessarily the best time to buy one. Nonetheless, if you're eager to get a tablet and you're already plugged into Apple's ecosystem through a Mac or an iPhone, this is undoubtedly the one to go for. Everyone else will have to make some hard decisions about whether it's worth the money.

Physically, it's got little to complain about. The iPad Air 2 weighs just 437 grams and features a 9.7" screen, and at 6.1mm thick it's one of the thinnest tablets around. Less than a quarter of the weight of an average laptop, it's hugely portable. Unlike earlier iPads, the iPad Air models can be comfortably held in one hand, which greatly improves their appeal – they're like the tablet the first few models were working towards.

Students will no doubt be pleased that they get free access to Apple's full office suite (Pages, Numbers and Keynote), their multimedia apps (iMovie, Garageband and iPhoto) and their full library of lectures, notes and reference materials on iTunes U, which almost makes them better than a Windows laptop. You get everything you need to make your tablet into the ultimate studying accessory.

The cheapest version of the iPad Air 2 has 16GB of storage as standard but nothing beyond wi-fi support. It's priced at £399, and comes in black/space grey, white/gold or white/silver colour combinations. It also comes in 64GB and 128GB varieties, and each is available with or without 4G. The most expensive version of the iPad Air 2 (4G, 128GB) costs an eye-watering £659; take heart, though, that's £80 cheaper than the equivalent model for the iPad Air 1 cost.



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It's not unreasonable to call the iPad Air 2 the best full-size tablet on the market, though it really comes into its own if you have an iPhone or existing iPad that you can synchronise content with. It's expensive, but you are paying for quality as much as the name. The truth is that no full-size Android tablet can convincingly best Apple's efforts, which is probably why most manufacturers don't even try. If you can afford one and don't feel tied into Android by your phone, it's worth going for. The only thing that might put students off is the price, but when you can get this much use out of a device, it'll practically pay for itself.

Surface Pro 3

Marketed with a surprisingly transparent tagline of "the tablet that can replace your laptop", the latest (and indeed, most successful) iteration of the Surface Pro has been available for almost a year now and has proven a formidable device for working on – not least because of its full Windows compatibility. What's it like for students, then?

The most immediate concern is money. Even the most conservative configuration – 64GB storage, Intel i3 and 4GB RAM – costs £575. For that money you do get a 12" higher-than-HD display, Wireless AC, a full-size USB 3.0 port, a Mini DisplayPort socket and a microSD card reader, so in hardware terms it is undeniably competing with a pretty good laptop – but it's priced to reflect that.

“ It's not unreasonable to call the iPad Air 2 the best full-size tablet on the market ”

The problem with Microsoft's bold claim is that you also need to buy the snap-on keyboard cover (or at least a Bluetooth keyboard) to make it properly productive. If you go the official route, that means shelling out another hundred quid. The tablet itself has a kickstand on the rear so you can prop it up, laptop-style, and the aforementioned cover incorporates an ultra-thin keyboard and trackpad, so you can actually use your tablet like a laptop if you prefer. There's also the Surface Pen stylus included for free.

Of course, while the cheapest Surface Pro 3 is acceptably cheap in laptop terms, the more expensive versions seem less and less so. The 128GB version with a Core i5 & 4GB RAM is £765. The 256GB version with a Core i5 and 8GB RAM is £972, the 256GB version with a Core i7 and 8GB RAM is £1170, and the best model – the 512GB, Core i7, 8GB RAM version – is a whopping £1395. Given that there's no other change in the hardware and that 64GB of SSD with 4GB of RAM is already well above the market average, it seems ludicrous to even consider anything other than the most basic model.

Since it's really aimed as business users, it's no surprise that the Surface Pro 3 is a little out of the range of most students – but maybe you can look at it as spreading the cost. This is a tablet that will easily last a three (or even four) year course, and you'll also get a free upgrade to Windows 10 to keep its software current. If you can stretch to one of the more basic models, it might actually be worth it.

The Best Tablet

So as you've probably guessed, it's hard to pin down the single best tablet for students and educational purposes, mainly because all of the most popular models are trying not to step on each other's toes. The Hudl 2 is the best for thrifty buyers. The Kindle HDX is best for those who want a tablet to play on, rather than work with. The iPad Mini 3 and iPad Air 2 are great for iPhone users who want, respectively, an all-rounder or a true laptop replacement, and the Surface Pro 3 is best for those who want true laptop power and compatibility. Admittedly, there are countless other tablets on the market right now that might fit into even smaller niches than we've looked at here – but stick with one of these devices and we're sure you won't go wrong. **mm**





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Two white TP-Link powerline adapters are shown at the bottom right. The one on the left is labeled TL-PA8010P and the one on the right is labeled TL-PA8030P.

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Laptops For All Budgets



Find the right portable for you at the right price...

Unless you have a really high-powered tablet, it's difficult to go to university or college without a laptop of your own. But the laptop market is home to a wide variety of devices, so picking the right one for your individual needs can be difficult.

Despite this, it's still necessary to own one. Laptops have enjoyed years of popularity as the preferred choice of most computer users, and while mid-range devices are looking increasingly endangered by the surge in tablet usage and the general trend away from high-powered computing, there's still life in them yet.

Ultimately, an up-to-date laptop is essential for the new academic year. Over the next few pages, we've picked out the best models we could find at a variety of prices, aimed at a variety of uses, so whatever you want, you should be able to find a laptop that meets your needs right here.

price than virtually any other new laptop around – and if you already have a reasonably good tablet or smartphone

and just want a cheap laptop to write essays on, or you're on a particularly tight budget, the low price is definitely



Super-Budget Buy:

Asus X102BA (£159)

A £90 discount on the Asus X102BA means you can pick it up for a lower

one of the most attractive things about it.

Whatever your reasoning is, the Asus X102BA's bargain price makes it worth considering. £159 is an insanely small amount of money for any system, let alone one this fully featured, because despite the price, the hardware is actually quite serviceable.

The core specs are low but acceptable for the price. You get an AMD A4-1200 CPU, which is a dual-core chip clocked at 1GHz. It's more in the power arena of tablets than full-size laptops, but the combination of a keyboard and Windows 8 makes it better than a tablet for working on. 4GB RAM is an adequate if unimpressive amount (if we were going to upgrade anything in this system, we'd add another 4GB). A 500GB mechanical hard drive is, at the very least, going to see you through a couple of years without any major space problems.

The screen is fairly small at 10.1", though the 1366 x 768 resolution actually looks better on a smaller screen due to the increased pixel density, so it might actually look better to you than other more expensive laptops. The display is also a touchscreen, which means it takes advantage of all of Windows 8's features. There's also a 720p webcam integrated into the top of the screen for video chat.

Connectivity-wise, the laptop has Bluetooth capabilities so you can attach extra peripherals wirelessly. There's an HDMI port, a 2-in-1 card reader and three USB ports in total: one USB 3.0 and two USB 2.0, so it's compatible with all the latest hardware despite its price. As well as an Ethernet port it also has Wireless N built in, so there's no need to buy any extra hardware.

Admittedly, it's not the most powerful system in the world. It definitely isn't going to work as a gaming laptop, and watching HD videos isn't impossible but could prove difficult at higher resolutions or if you're doing anything else. Like many modern laptops, it lacks an optical drive, so it's really not set up for entertainment, but if you're looking for something to write on, it's going to do the job.

We're not sure it's necessarily going to complement a tablet any better than a Bluetooth keyboard would, especially since it's not actually much more powerful than a £250 tablet would be – but if you can't afford or don't want a tablet, it'll be worth the money, and at 1.1kg it's not too heavy to carry around with you either.

“ Laptops have enjoyed years of popularity as the preferred choice of most computer users ”



Mid-Level All-Rounder: Lenovo Essential B50-70 (£240)

Going for the cheapest hardware available might have its advantages, but what are your options if you want something with a little more heft behind it? If you're in the market for a general-purpose laptop that won't break the bank, we think the Lenovo Essential B50-70 represents a good choice.

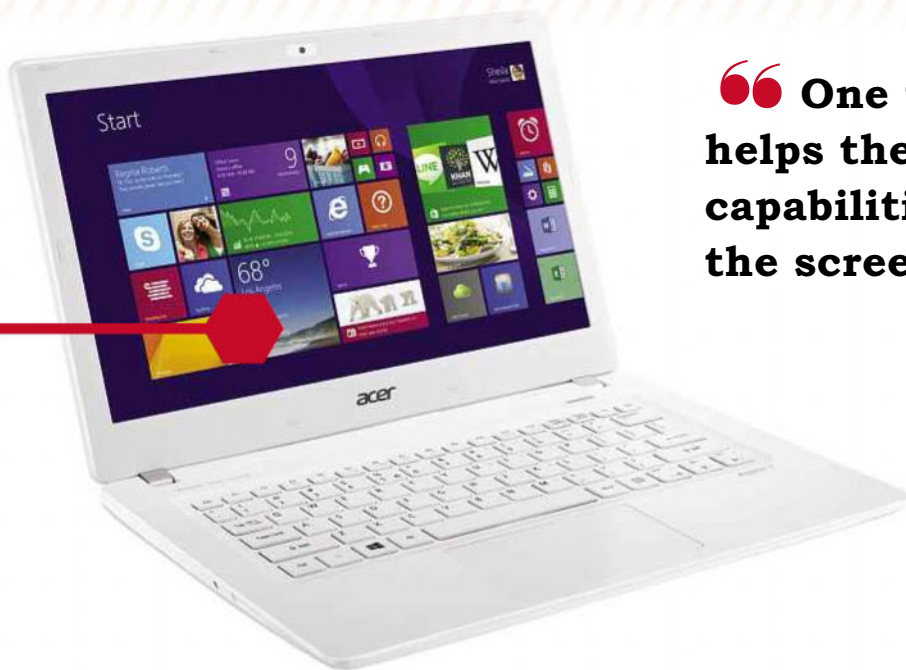
Rather than a low-price, low-performance chip, like an AMD or Intel Pentium/Celeron model, the B50-70 contains an Intel Core i3-4005U, which is a dual-core chip that's part of the Haswell line and clocked at 1.7GHz. Even though it's a mobile chip, it's more than capable of running your operating system, applications and web browsing at a fair pace. You might even squeeze a game or two out of it, though nothing fancy.

The Core i3 pedigree gives this notebook the grounding it needs to take a convincing stab at just about anything you want it to do. If you're a light-to-moderate user (i.e. planning to use your system most days instead of once or twice a week), then this CPU or a comparable

model is the minimum you should be aiming for.

Aside from that, you'll find a lot of similar hardware to other budget laptops. Once again, 4GB of RAM is an adequate amount for a low-price system, but if you can afford more you'll get a decent performance hike out of it. A 500GB hard drive is fine to run a system off without any particular maintenance required over its lifespan. The screen is 15.6" with 1366 x 768 pixels, which won't offer stunning visuals, but is standard for sub-Ultrabook systems – and there's still a DVD-RW and 720p webcam.

Connectivity includes a USB 3.0 port and a pair of USB 2.0 ports, a 4-in-1 card reader, Fast Ethernet and Wireless N networking, and both VGA and HDMI graphics ports. The only real areas where it could be better are its weight (it's a pretty hefty 2.15kg) and battery life, which is at the bottom end of what you'd consider useful at just five hours on a single charge. But it'll give you a decent system to work and watch videos on, and maybe play a few games too. For under £300, that's not bad.



Gaming-Capable Entertainment Laptop:

Acer Aspire V3-371 (£459)

If you want a laptop that'll allow you to do everything you want *and* play games, you'll have to start spending serious money. One of the cheapest we've seen that ticks all the right boxes is the Acer Aspire V3-371, which is about as expensive as a high-end smartphone or tablet but gives you significantly more power for the money.

The chief benefit is the processor, which is an Intel Core i5-5200U. Based on the latest 14nm chip technology (Broadwell), it's a dual-core mobile processor clocked at 2.2GHz. Its Intel HD Graphics 5500 GPU also goes a long way towards making it capable of running games at a fair rate (probably only at modest resolutions and detail levels but playable, at least).

8GB of RAM is also a welcome addition, doubling the amount found in most cheaper systems, which gives it a decent capacity for running lots of Windows software too. If you're a student and you find yourself doing visual design work or multimedia editing, those 8GB of RAM will soon show their worth. If not, you can at least be happy they're available to handle your multitasking needs without resorting to slow, disk-churning swapfiles.

One thing that definitely helps the entertainment capabilities of the system is the screen, which is a fair-sized 13.3" display with a full HD resolution of 1920 x 1080. This puts it a tier above the other systems we've looked at, although it's

modern enough not to have a DVD drive, so if you want to watch movies off a disc (retro!), you'll need to buy a separate one.

Connectivity is almost entirely great, with gigabit Ethernet, Wireless AC networking, Bluetooth and HDMI. The only way it falls short is in having just two USB ports (one USB 2.0, one USB 3.0), but that problem can be easily solved with a hub. There's also a built-in webcam and an SD card

“ One thing that definitely helps the entertainment capabilities of the system is the screen ”

reader, so you get pretty much everything you need for an all-round experience that includes the ability to play games.

Of course, the price for all this is considerably steeper than simpler systems, and you could buy several of the cheapest laptops on our list for the price of this alone, but unlike other systems, which might need significant maintenance (if not a complete replacement!) after a year or two, we can imagine this remaining competitive for the full length of a university course. So even if you're worried about expenses, it might be worth considering this one an investment, rather than a high expense.

High-End Laptop: MSI Prestige PX60 2QD-048UK (£800)

If you want a laptop that crams in the power of a desktop but doesn't cost over a grand, like most Ultrabooks, then your



Dallas in wonderland

'Dallas in wonderland: adventures in science television'
Wednesday 9 September,
National Media Museum, Bradford
20:15-21:15

Dallas Campbell is a TV presenter with a penchant for science. He's presented numerous entertaining and informative science shows, and is most well-known for presenting 'The Gadget Show', 'Bang Goes the Theory', and now 'Britain Beneath Your Feet' on BBC One.

'Dallas in wonderland: adventures in science television' at the British Science Festival will explore Mexican sewer diving to space station Soyuz launches, as Dallas shares hair-raising tales from the frontline of science TV programme making, and talks about the challenges of bringing big science to the small screen.



Tell us more about your event at the British Science Festival.

I've been lucky over the years to have filmed some fascinating stories in some extraordinary locations so it's going to be a bit of a whirlwind show and tell. And also a chance to talk about my own science adventure – Why & how I'm doing what I'm doing and why we need to think of science in a much broader less isolated way.

Why did you want to come and tell people about your experiences as a TV presenter at the British Science Festival?

Because television is still one of the main windows in which we can all explore the world. I was hugely influenced by science television growing up. It's a fantastically powerful way of getting people engaged with a wide range of ideas, places and people.

What's the scariest thing you've done for a TV programme?

Sitting on a twitchy horse as the world's largest Brazilian cattle herd decide to break rank and stampede past. was pretty terrifying!

What's on your TV presenting 'to do list' - is there anything you'd like to do, or anyone you really would like to work with?

My list is long & extensive. I have wide ranging interests. In an age of obsessive specialisation this is sometimes 'remarked upon' which is a dreadful shame. The Ascent Of Man by Jacob Bronowski is still television's greatest science series to which we all aspire. If Tomorrow's World ever returned to our screens I would lobby hard to be in the line up. Werner Herzog is high on my list of fantasy people to work with. He has a wonderful way of interpreting the world. I want to try & make interesting, entertaining, thought provoking, popular telly that people want to watch that isn't measured by brow height.

What inspired you to take part in Britain Beneath Your Feet?

The chance to explore Britain in a way that hadn't been done before. To have a good old rummage in Britain's basement if you like.

What's the most interesting fact or place that you discovered during filming?

There's a top secret BBC studio in a top secret nuclear bunker underneath Edinburgh. And I'm the only person to have used it.

What else would you like to know about the underground world?

What underground secrets lie hidden beneath other parts of the world.

And finally, will there be any more episodes in the future?

Good question. We shall have to wait and see.



You can see Dallas present his show on Wednesday 9 September at the National Media Museum, Bradford for free. To find out more and book tickets visit britishsciencefestival.org

The British Science Festival is supported by Siemens and hosted by the University of Bradford

options don't really start until close to the £800 point. The MSI Prestige PX60 is available for that sort of money and has specs that blow even the most expensive tablets out of the water completely.

The CPU is a Haswell-based Core i5-4210H, a dual-core chip clocked at 2.9GHz. It's a little older than the Broadwell chip we saw in the Acer Aspire V3-371 but only by a matter of months, and that contributes to a proportionally better performance-to-price ratio. Again, it has 8GB of RAM, and in this case there's a mechanical hard drive of 1TB in size – good enough for any long-term use, though standard at this price.

The way it really proves its credibility as an entertainment machine is with a built-in 3GB GeForce GTX 950M, which means it's almost as good at gaming and playing HD video as any full-size system. It's not necessarily any better when it comes to working on, but that extra hardware will make sure you can play games in style, especially when combined with the fast CPU. The 15.6" anti-glare screen is also full HD (1920 x 1080), so you have plenty of pixels to cram extra detail into. If you have a 4K display handy, it's even powerful enough to output 4K video.

Connectivity is also top notch, with 2x2 Wireless AC, gigabit Ethernet, Bluetooth, card reader and webcam. The three USB ports are all USB 3.0. And there's a DVD drive too! It's worth noting that the speakers are supplied by Dynaudio, for better quality than standard laptop speakers, and a built-in MSI Audio Boost feature can enhance the volume by 30%. You also get access to an exclusive feature called 'SHIFT', which allows you to tweak the power management on the fly, so you can maintain the best balance of performance, temperature and battery life depending on how your power situation and needs meet up.

One of the few genuine disadvantages is that it's quite heavy. At 2.1kg it's a lot heavier than most laptops and tablets, which is mostly due to the graphics card and associated hardware, but that knowledge won't make it any easier to carry around with you for a day or two.

Still, if you want a laptop that'll last you the entire length of your course, this isn't a bad one to go for. Its processor and graphics chip are good for a few years yet, 1TB of hard drive space should last a couple of years before it gets filled, and while 8GB of RAM might need an upgrade in a few years, there's space for more DIMMs. We're

HP Chromebook 11 (£140)

If you want to save even more money on a cheap laptop, you could consider buying a Chromebook. The HP Chromebook 11 is one of the cheapest available, priced like a budget tablet but with the keyboard (and size) of a notebook PC. The hardware is powered by the Exynos 5250 CPU, which is the younger sibling of the CPU in the Samsung Galaxy S4.

Clearly with that kind of hardware in it, you aren't getting a powerhouse system – but Chromebooks have the durability of a laptop, with the comfort of a keyboard and trackpad, so if you're trying to spend as little as possible on a laptop it's worth taking a look at.

For most people, the obvious hurdle is that it runs Chrome OS rather than Windows. It's not a bad operating system, but the fact that it's an unfamiliar one might put low-end buyers off. Chrome OS is essentially just a browser, and within that you can do anything you want online with limited capabilities elsewhere. Specs include an 11.6" 1366 x 768 IPS screen and a genuinely good keyboard, 16GB of SSD storage and 2GB of RAM. Wireless N networking is built in.

But it's only a laptop in form. In function, it's more basic than most tablets. It's very much a casual-use machine, good for watching video, writing emails or browsing the web, but not for much else. It's lightweight and well built, and while the battery life isn't great, it does charge over micro-USB (you know, like a tablet). The question you really need to answer if you look to buy this system is why you aren't just buying a tablet. If your response to that question involves the words 'larger screen' or 'hardware keyboard', then carry on. If not, there are better options available.



“ If you want to save even more money on a cheap laptop, you could consider buying a Chromebook ”

not sure it's worth a student spending any more on a laptop than this, but if you buy this one, you definitely won't feel as though your money was wasted. [mm](#)

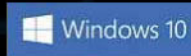
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Gadgets For Students

These extras could make studying a breeze...



When you start pursuing further education, you quickly discover that life gets a lot more complicated. Being away from home, responsible for your own life, education and finances means there's always a lot of things to think about – not to mention the new regimes and working methods you have to develop to get you through university or college itself.

Luckily, there are plenty of gadgets out there which can help you get your life in order. And over the next few pages, we'll show you which ones we think you can't live without.

Out And About

Some gadgets make your life easier when you're out and about, and are designed to practically live in your rucksack. Whether you're visiting friends, working in a cafe or on campus, these are the tools you need.

Kensington ComboSaver Notebook Lock (£15)

When you're a student, your laptop can quickly become your life. It helps you communicate with friends, enjoy movies and television, and provides a place for you to work when you're on campus, staying in halls or crossing the country to go back home. But laptops are easy to sell and light enough for a quick getaway, which makes them a particular target for thieves. Passwords can protect your data – but what about the hardware itself?

The best way to secure it is probably to use Kensington's signature lock. Never again will you have to worry if you step away from your laptop to get a book or drink or leave it visible in your room while you're out. Simply attach the lock (most notebooks have support for one) and any would-be thieves will be thwarted.

The ComboSaver lock is great for students because there's no need for a key, so you don't have to worry about keeping a key safe. All you have to do is keep the four-digit code in your head. The 1.8 metre self-coiling cable means you shouldn't have any trouble anchoring your laptop somewhere. The price is so low that it barely compares to the cost of a replacement, so whether you're at university or not, this is one piece of hardware that anyone who uses their laptop in public should get hold of.

Kindle Paperwhite (£110)

Students are expected to read a lot of books, and nothing's more frustrating than not having the one you need – except, possibly, having to carry books you might not need in your rucksack at all times. Rather than weigh yourself down, it makes



“ Whether you’re visiting friends, working in a cafe or on campus, these are the tools you need ”

a lot of sense to buy an e-reader to take with you wherever you go. And of the available e-readers, it’s Amazon’s that provides the simplest user experience.

The device comes in two main varieties: the Kindle Paperwhite and Kindle Voyage. The former is the cheaper of the two and has a touchscreen, which is also a self-illuminating E Ink display, so you can read it in dark or low light without any lighting attachments. There’s 4GB of storage – a huge amount in terms of ebooks – and a new chip that gives it faster pageturns than earlier Kindles. It also has a slightly higher resolution screen.

You can still buy a standard Kindle for as little as £59.99, so beware that you’re essentially spending £50 for a light-up screen and slightly sharper text – but if you’re into late-night cramming or just like reading in bed, the Paperwhite’s going to save you time, money and effort in the long term.

Logitech K760 Solar-Powered Keyboard (£60)

Not everyone wants to carry a laptop around with them all the time, but trying to write an essay on a touchscreen requires a level of desperation we hope no one ever meets. Luckily, a Bluetooth keyboard can bridge the gap between tablet and laptop, allowing you to write essays, emails and revision notes without the bother of strapping a computer to your back every time you leave the house.

Logitech’s K760 keyboard even goes a step further than most: rather than batteries, there’s a built-in solar panel, which allows it to generate electricity using nothing but the light in a room. You might be concerned if you don’t plan to use it outdoors, but a full charge allows it to operate for three months even in total darkness, so even low indoor light is enough to keep it going. Even better, it also has a multi-device switcher, so you can pair it with multiple systems and swap between them in a single button press.

As keyboards go, typing on it is pretty much a standard experience, but this combination of features is more than enough to transform it from average into superior.

In Your Room

Whether you’re renting with friends or staying in halls, some gadgets need to stay in your room. If nothing else, it’s worth remembering that not everything you equip yourself with has to be directly related to work and learning. Sometimes you just need stuff that’ll let you have a good time too.

eGadget USB Fridge (£13)

One of the downsides of shared accommodation is that you can’t leave your room without the risk of bumping into someone. This is fine if you’re feeling social, but when you just want to be left alone to work, it can mean the difference between getting your revision done and waking up the next morning with a traffic cone in your room and no memory of how it got there. An in-room fridge is the ultimate student accessory, and while mini-fridges are banned in most halls, no one can do anything about something as innocuous as this: the USB mini-fridge.

Powered entirely over USB, this fridge is the perfect size for a single 330ml can, a few bars of chocolate or whatever else you fancy. You can use it to keep parts of your lunch fresh, save a snack for later or just to make your friends jealous. The built-in cold plate starts chilling within seconds of being plugged in and maintains a temperate of just a couple of degrees without any difficulty.

In case you’re wondering, it’s only taking power from USB, so it’s completely driver-free to activate and works on virtually any





port, whether that's on a computer, TV, printer or anything else. It doesn't even need to be that close to a USB socket to work, because it comes with a 4ft cable so you can easily trail it from your desk to the floor without having to drill a hole or balance it precariously. It won't just keep your drink cool; it'll impress your friends as well.

Google Chromecast (£29)

Google's Chromecast plug-in is an HDMI dongle that allows you to stream and share content to any screen with an HDMI-in port, effectively turning that device into a smart TV. If you don't have the space (or money) for a full-size smart TV (for example, if you're a student), then it should quickly become clear what this is useful for.

What the device actually allows you to do is wirelessly transmit the visual output of any smartphone, tablet or PC to an HDMI-enabled monitor or TV using your existing wi-fi network. That means you can show off your photos, play media and stream content from apps like Netflix or iPlayer directly onto your TV. You could even use it to play compatible smartphone games on a TV like it's a regular console!

Not only is it substantially cheaper than buying a smart TV, it's also considerably more compact than one (or indeed, any similar set-top box). A wide range of compatible software means you can customise and modify its behaviour to suit your needs. As all-purpose entertainment hardware goes, it's something we think any student could benefit substantially from.



SleepPhones (£30)

If you want to try wearing headphones to bed without the risk of yanking your phone off the nightstand whenever you turn over or having the earphones drop out just as your head hits the pillow, then SleepPhones are the answer. For £30, you can buy a pair of these headband-like devices, which incorporate two discreet speakers. They can pipe music, ambient noise, podcasts or anything else you desire directly into your ears as you sleep.

If you've ever lived in a student house or halls of residence, you probably know why headphones you can wear to bed are a good idea. And if you haven't, just try to imagine what a party sounds like at 4am when you're trying to sleep in the room next to it and have to be awake for a lecture at 9am. And if you can successfully imagine that, you'll get why a pair of headphones you can wear to bed is a good idea. If you can't get silence, at least you can drown out their noise with your own.

SleepPhones are machine washable and available in a variety of colours and sizes from extra-small to extra-large (although the medium is likely to be enough for most people). The £60 Bluetooth versions probably work best, but if you want to save money and don't mind tucking your phone under the pillow, you can get a cheaper, wired pair for half the price.



Portable Storage

Keeping your data safe is one of the most important things for anyone who uses a computer, but when you're in education, a crashed hard drive could mean the difference between graduating with a first and being stuck for another year. You need to make sure you have the hardware to keep data backed up and portable at all times.

Samsung M3 1TB (£45)

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“ If £36 sounds expensive for a USB drive, you need to take a moment to check out the feature set available to you on the iStorage DataShur line ”

data storage: they're cheap, they store more than enough data for one person, and they generally remain functioning for years without any significant errors. If you're a student heading off to university, it's a good idea to get an external hard drive for storing backups of your work and filling out with other important data, like games, movies and music.

The good points about the M3 range are quick to cover: a USB 3.0 interface means super-fast transfer speeds and file access times. Its 1TB capacity gives you enough storage for all manner of purposes. Crucially, it's powered entirely over USB, so there's no need to find a separate power socket to run it, and you get compatibility with almost anything that has a USB port, from computers and laptops to games consoles, set top boxes and even routers with network storage capabilities. It's also lightweight and portable but reasonably sturdy, and because it's Samsung, it looks great and has fantastic reliability.

iStorage DataShur 4GB (£36)

If £36 sounds expensive for a USB drive, you need to take a moment to check out the feature set available to you on the iStorage DataShur line. This is a USB drive that places security above all else, and when you're a student, keeping your data protected is important to prevent plagiarism and snooping. After all, flash drives are easy to lose track of, especially if you're travelling to and from the campus or dividing your time between work and a laboratory.

Happily, the security on iStorage's specially enhanced USB key is so strong that you could drop it in the middle of MI5 and not have to worry about anyone seeing your personal data. A combination of 256-bit encryption and hardware-based access code should ensure that no one but you can get at your drive's contents. Even a keylogger won't stand a chance of stealing your passcode, because you punch it onto the device by hand, and the unit's military-grade hardware-based data encryption means that the contents are gibberish even if read directly from the storage cells.

Best of all, the device itself is what contains the security. There's no need for additional drivers or software, and it's compatible with any operating system. It's also water-resistant and constructed from shock-proof aluminium casing designed to shield it from the elements. We won't pretend it isn't expensive compared to bog-standard storage, but if security is a priority, then it's tough to beat.

Lexar Jumpdrive S73 (£7-£100)

If you're in the market for a USB 3.0 flash drive, sooner or later you're going to find yourself staring down the barrel of the Lexar JumpDrive S73. They're cheap-looking, they're only a tad faster than USB 2.0 drives, and they're pretty flimsy too – but you can't argue with those prices. And especially if you're a student looking for some cheap, portable storage, that's a quality that's hard to ignore.

Although the RRP's are higher, if you shop around you can find an 8GB stick for £7, and the prices range up to £100 for 256GB. Quite simply, the pricing makes most of its inadequacies immaterial. Even if you're buying the 256GB model, the slow speeds will barely stack up enough to be noticeable. The facts that matter most are that it's faster than every other USB 2.0 drive and cheaper than almost any other USB storage drive around. We think the 32GB model (£19) is a fair balance between price and capacity, but you can't go wrong with this. [mm](#)





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Essential Cloud Services For Students



Could you benefit from online storage and services?

Most modern students can expect to have at least two computers in their life, whether that's a desktop at home and one in the computer lab, a tablet and laptop, or a smartphone and desktop system. Where, in the past, a portable and well-stocked system was all you needed to keep your education streamlined, it's now a virtual necessity to use cloud-based systems to reduce duplication and improve access. The most useful place to store your data and software is no longer on a single device, but online.

There are loads of cloud-based services to choose from, though, so how can you tell the real deals from the here-today-gone-tomorrow chancers who charge over the odds and promise more than they can deliver?

To help you get to grips with cloud services, we've rounded up the best and most popular. Whether you're a student looking to save time and money or a business professional who wants to spend less time and energy trying to keep multiple devices synchronised, we've got all the information you need to get the most out of the cloud, whatever you're using to access it.

Cloud Storage

USB keys and memory cards might be cheap and convenient, but they're also incredibly easy to lose. Cloud services are far more reliable, and all you need to access your files is an Internet connection and a browser – those native applications commonly make the process even easier.

Storage provision and syncing between various devices is undoubtedly the killer app for cloud services, encouraging thousands to become accustomed to the simplicity of making the Internet into an extension of your home PC. As its benefits have become clear to more people, it's no surprise that this sector has become one of the most overcrowded and competitive technology areas. So which provider is best? And how much do they cost?

1. Dropbox dropbox.com

The most well-known cloud storage provider, Dropbox gets away with a lot thanks to its recognisable name. It doesn't offer the most space, the cheapest pricing or the fastest speeds – but it does have a large and loyal customer base, and that inspires confidence in a way few other things can do.

One of the things Dropbox does do well is support every platform. It's the only provider with native apps for Windows, Mac OS, Linux, Android, iOS, Windows Phone and Blackberry, and its API has been picked up by developers everywhere – meaning you can access your online direct from many other programs.

Free accounts start with 2GB of space, though that can be increased to 16GB using bonus and referral systems. For £8 a month you can up this to a massive 1TB of storage, and even get a discount by paying £79 for a year upfront.

2. Google Drive drive.google.com

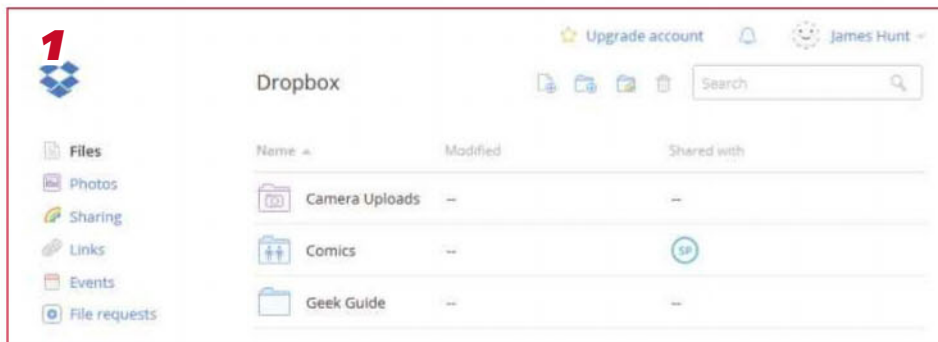
Tying in with various Google platforms, Google Drive is a little less streamlined than many of its competitors. However, as well as a fully-featured online office suite to edit documents with (of which more later), users can get 15GB of storage for free. Indeed, if you have a Google account, you've probably already got it.

There are Google Drive apps for Windows, OS X, iOS and Android, though Windows Phone users are out of luck for the moment due to ongoing hostilities between Google and Microsoft. Close integration with Google's mail service is a particular highlight when it comes to Google Drive, and its competitive pricing is certainly worth taking note of.

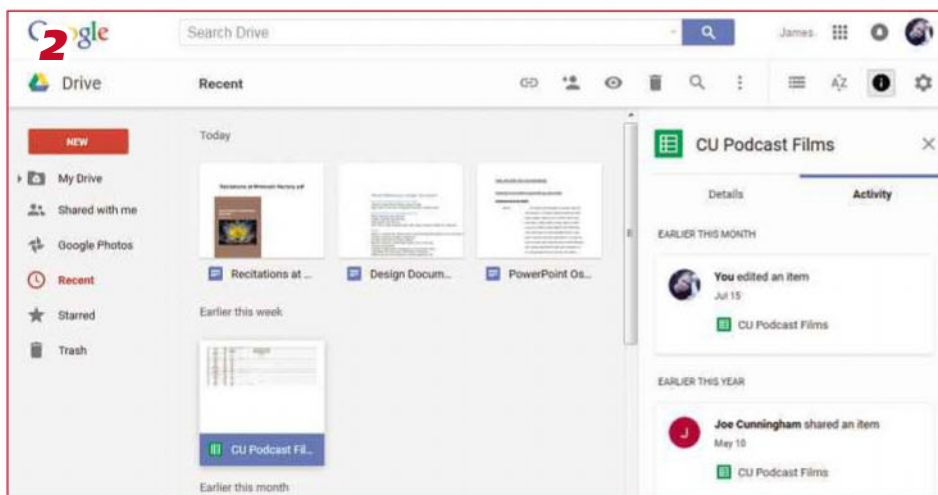
15GB for free means it's already better than most, but you can pay \$2 a month for 100GB, \$10 for 1TB, and up to \$300 a month for 30TB – though we expect that even 15GB would be enough for any single user.

3. Microsoft OneDrive onedrive.live.com

Previously known as Windows Live SkyDrive, OneDrive was an early entrant into the cloud-storage race, but managed to get things drastically wrong in terms of both feature set and pricing, which caused the service to quickly languish. In recent years, a Dropbox-inspired overhaul and tighter integration with high-uptake software like Windows 8 and Office 2013 has done a lot for its popularity.



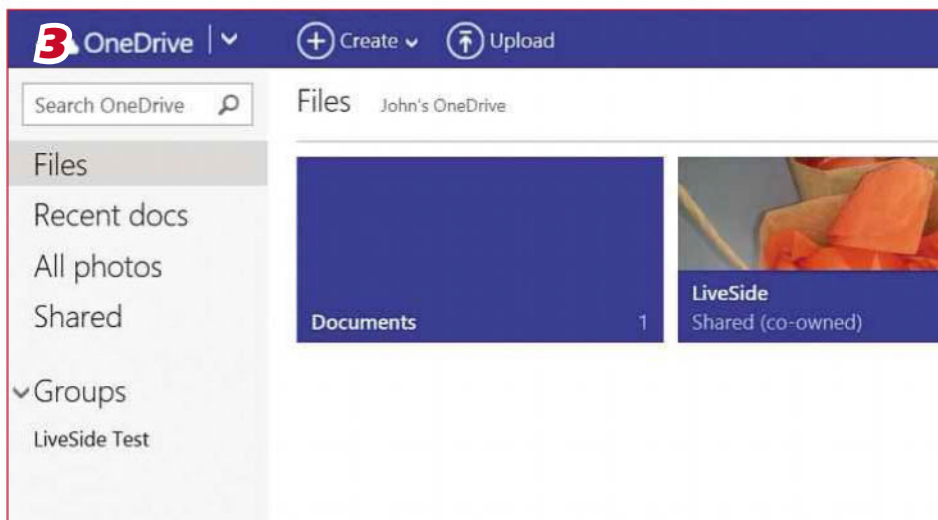
In addition to desktop applications for Windows and Mac OS, SkyDrive software is available for Windows, Windows Phone, Mac OS, iOS and Android. New sign-ups to the service get 15GB of space free, and you can earn up to 5GB more by referring friends and uploading photos. Their pricing is slightly more than Google's at £2 a month for 100GB of storage and £6 for 1TB.



4. Apple iCloud Drive www.icloud.com

Last year iCloud changed its functionality to become a lot more like Dropbox *et al*, allowing you to store non-Apple documents and access them from a PC. As well as support for Apple's main platforms, Mac OS and iOS, It's even got a Windows app – though Android, Blackberry and Windows Phone users are out of luck.

Although iCloud offers 5GB of storage for free, 20GB of storage for 79p a month, with additional options up to £15 for 1TB, it has to be said that it's mainly useful for existing Apple users – especially with its free iWork Office suite and mobile device backup features. If you only work on your Apple hardware then it's at least good enough to avoid paying for another – but until it's on more platforms and has advanced features like sharing and collaboration, it's never going to give the big names any grief.

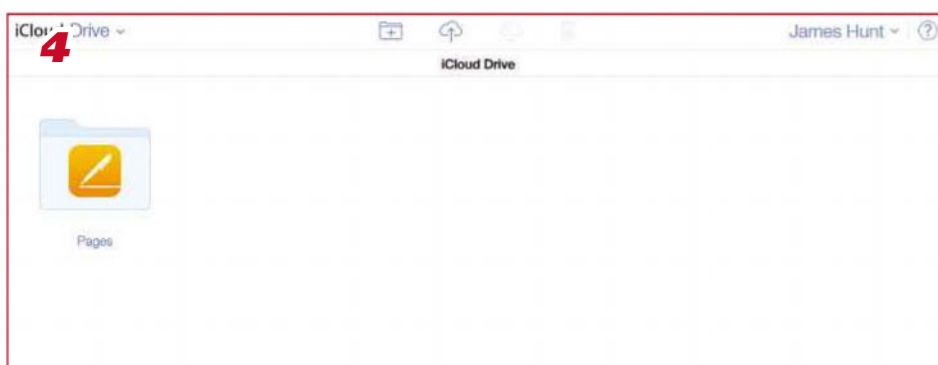


Verdict: While OneDrive and Google Drive are both far, far cheaper than Dropbox when it comes to buying extra storage, you can't really beat the compatibility, simplicity and large feature-set that Dropbox offers. Even the likes of Google and Apple's online office suites aren't enough to convince us that they're worth paying for. Unless you have unusually high data needs or want to collaborate with lots of other people, Dropbox is undoubtedly the storage service to beat.

Office Software

Being able to access your files from anywhere is one step towards true cloud-based computing, but what about the other side of the equation? If you want to get the most productivity out of cloud computing, maybe you need to be able to work from anywhere, regardless of whether you've got your own device with you or not.

Compared to storage, cloud-based office suites are relatively new on the scene and companies are still feeling their way into the market, but it's a safe bet that almost all major applications will be delivered in this way eventually.

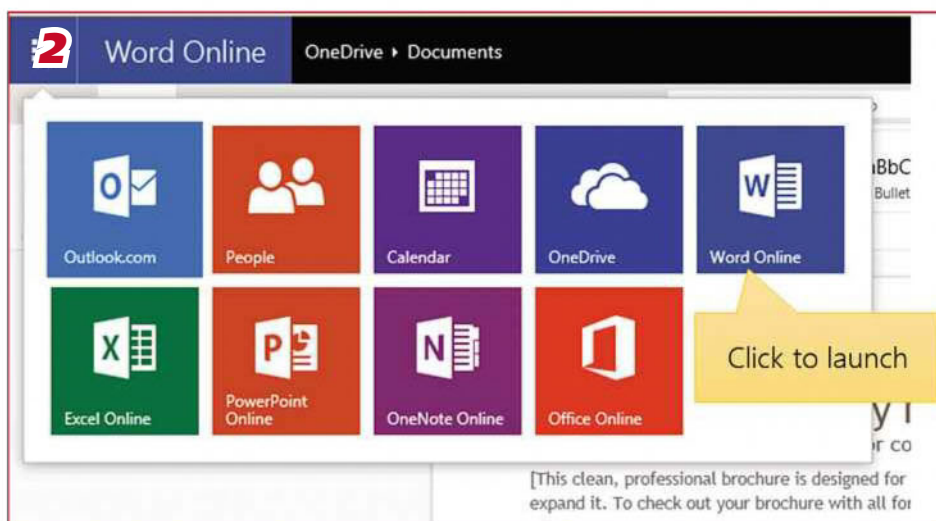
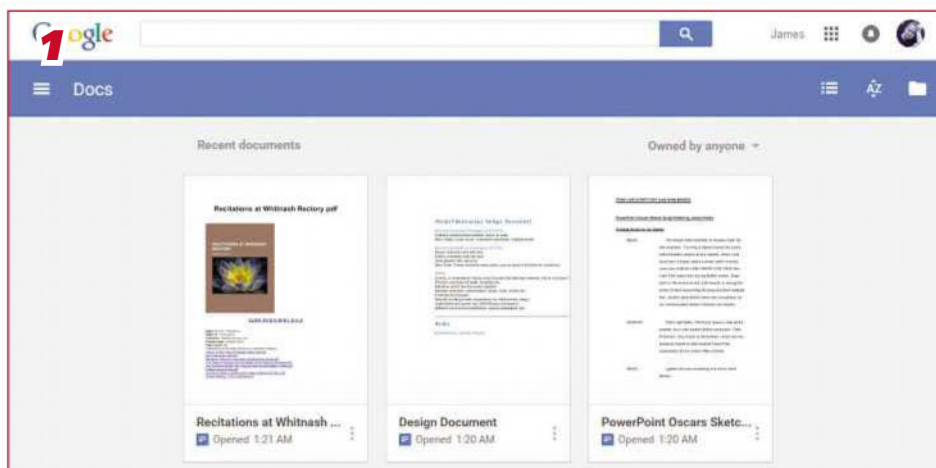


1. Google Drive docs.google.com

We've previously skimmed over the fact, but it's now relevant: the current version of Google Drive incorporates the cloud-based software suite formerly known as Google Docs. This means that if you've got a Word-compatible document, Excel-compatible spreadsheet or PowerPoint-compatible presentation anywhere in your Google Drive (including your email) you can view and edit it online, all without leaving your browser.

Google's software packages – called Document, Spreadsheets and Presentation – are all fairly straightforward and simple, and incorporate all of the most widely-used features. They're basic, but good enough for the kind of low-impact on-the-fly editing you'll probably use them for. The interfaces are toolbar and icon driven, similar to pre-Ribbon Microsoft Office versions. One of the more interesting features allows you to automatically translate documents using Google's language tools. Which is rather nifty, though imperfect in the way only machine-translation can be.

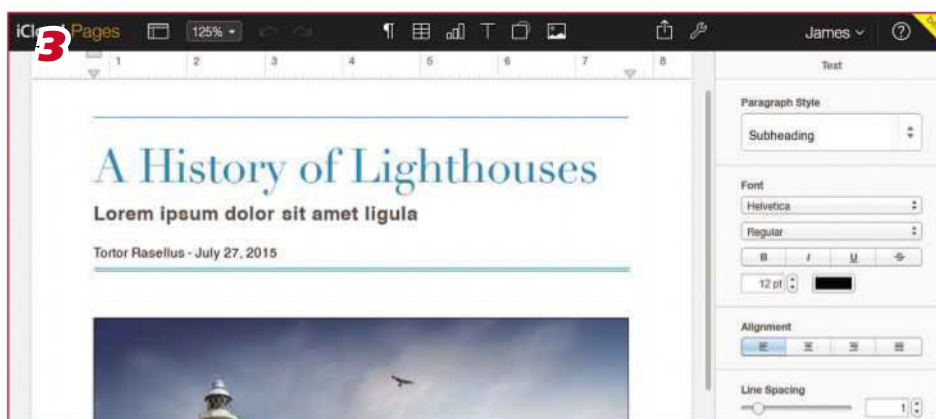
Although good, Google Drive's tools aren't really powerful enough to function as a replacement for a full office suite – but if you're hoping to do some light editing prior to submission, they'll hold up. They're free to access, easy to use, and accessible across a range of devices. Definitely worth keeping in mind, though perhaps not good enough to consider your first choice.



2. Microsoft Office 365 office.microsoft.com/en-gb

Unsurprisingly, Microsoft Office 365 costs a lot more than Google Drive's office editing suite, since Microsoft doesn't give away its software like Google does. Even so, it's far from unreasonably priced, and does at least try to justify itself by offering users access to the complete versions of Microsoft Office software hosted on Microsoft's own servers. Rolling updates mean you always get the latest versions of the software, with their features fully intact.

If you just want the online version of Office, £3 a month for 12 months stacks up to £37, though you can also pay monthly at £4 a month. This plan includes Office Online and 1TB of OneDrive space. If you want the desktop software (for PC and Mac) as well, you'll have to pay a more princely £7 a month which stacks up at £84 a year – and again, single months can be bought for £8.50. Students get a particularly good deal, though – there's a special university subscription, which costs just £60 for four whole years, and includes licenses for two devices, 1TB of



OneDrive and 60 minutes of Skype calling a month. That's pretty tough to beat.

Although it seems impressive, there is one potential issue with Office 365: it isn't well supported across devices. You can use the main suite on two PCs and the web apps work on any browser, but native apps for non-Windows devices aren't very well provided and may not even exist on your preferred platform. It is – despite claims of universality - aimed at desktop users above all others.

3. Apple iWork www.icloud.com

Again, Apple rolled out free iWork access recently so that it could better compete with other cloud services, and that means iWork for iCloud is still in relatively early days – though it is officially out of beta, at least. Before February this year the apps came free with new iPhones and iPads, but now even Windows users can access the online versions of Pages, Numbers and Keynote, Apple's version of Word, Excel and Powerpoint.



How 3D-printed rats could offer schools a vegetarian dissection

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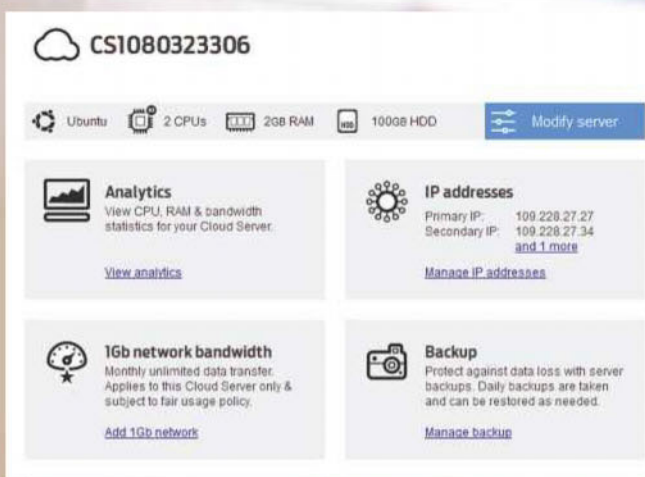
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The screenshot shows the Fasthosts control panel for a cloud server. At the top, it displays the server ID 'CS1080323306'. Below this, there are icons for the operating system (Ubuntu), CPU count (2 CPUs), RAM (2GB), and HDD (100GB), along with a 'Modify server' button. The main area is divided into four panels: 'Analytics' (with a 'View analytics' link), 'IP addresses' (showing primary and secondary IP addresses and a 'Manage IP addresses' link), '1Gb network bandwidth' (with an 'Add 1Gb network' link), and 'Backup' (with a 'Manage backup' link).

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As you'd probably expect, the cloud-based incarnation of these apps doesn't quite live up to the desktop version's, so they're more in the league of Google's document-editing software than Microsoft's. They're certainly functional, but the lack of access to the desktop versions of the software, the limited capabilities of native iOS apps and the lack of native apps on non-Apple platforms means, once again, that iWork for iCloud is best aimed at very light users who are already in the Apple ecosystem.

Verdict: The large disparity in pricing means it's very hard to pick an Office suite to recommend. Microsoft's is by far the most powerful, but it isn't free like the others and while desktop support is great, mobile support is bad. Google and Apple both have decent mobile support, but are awful experiences on the desktop. Ultimately, we'd probably suck up the cost and go with Microsoft (especially if you can get the University edition) not least because they offer native desktop, mobile and cloud applications, whereas Google and Apple give you one or two of those at best. It's money worth spending.

Antivirus Software

Pretty much every serious anti-virus program has some cloud component these days, whether it's 0-day definition updates or full delegation of virus detection to the cloud. If you're a student, the likelihood that you'll be passing files around while working on collaborative projects is relatively high, and you can't rely on everyone to be as vigilant as you are about keeping their systems clean.

The big problem with most antivirus programs is that they aren't reliably cross-platform, and they're certainly not accessible on machines they haven't been installed on. That's fine if you only need to keep your PC safe, but if you're using someone else's, you can't exactly use one of your licenses.

Luckily there are antivirus programs that work entirely in the cloud. They're no good for providing real-time virus protection, but if you just want to check a file or verify its integrity before opening it on a system that you haven't personally secured, it's far better to use one of these than the alternative.

1. Trend Micro Housecall housecall.trendmicro.com/uk

Developed by popular antivirus publishers Trend Micro, Housecall is an online virus scanner that can check a system's integrity without installing any permanent components. As well as scanning for files for viruses, it can detect trojans, worms, malicious browser toolbars and plug-ins, and even document-based macro viruses.

As well as in-browser scanning, it pulls substantial elements of its functionality from the cloud. This means it can be used on PCs of almost any power or age. Scans can be targeted at folders or applied across an entire system, while a 'Quick Scan' option checks the most vulnerable and critical parts of Windows.

As tools go, it's a good choice; it isn't cross-platform, but it allows you to check any Windows PC you want to work from.

2. VirusTotal www.virustotal.com/en-gb

Acquired by Google some time ago (but still independent), VirusTotal is an online 'metascanner' that uses up to 55 different antivirus engines to check any file you upload to it, or any URL you enter. This makes it an incredibly useful tool for one-off checks – it's even cross-platform, meaning you can scan content from your tablets and smartphones as well as any desktop system.

A max file size of 128MB will accommodate most files you might want to check, and although the number of engines does inevitably lead to some false positives, it's easy to smooth them out; one positive versus 30+ negatives will suggest a problem with the scanner, not the file! Greater integration with the desktop would improve it, but there are few tools that do this job as simply and correctly as VirusTotal. That makes it virtually indispensable.

Verdict: The simplicity of VirusTotal makes it ideal for checking a few files before passing them around. Trend Micro Housecall, by comparison, is attempting to do the job of a full-scale anti-virus application but, as useful as cloud-based software is, you can't really rely on it for full protection of your system. Use the latter in a pinch, but this is one case where the cloud is only useful if combined with proper offline software. **mm**

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What's Next For Digital Radio?



Most people know what DAB radio is, but what is DAB+ and why don't we have it in the UK? David Crookes takes a look

It may feel that Digital Audio Broadcasting is a relatively recent innovation, but the first country to roll it out was Norway, a smidgen over 20 years ago. Britain was not that far behind; the BBC debuted digital radio in September 1995. Yet, the fact that we're still talking about adoption rates of DAB shows just how slow it has been to take off. In 2008, things were so bad that emergency talks took place in Manchester to save digital radio, and it was being heralded as a very British failure in some quarters of the media.

Since then, a concerted effort has been made to encourage people to switch, and while the much heralded turn-off date for FM has been pushed back (it was due to be switched off this year), Ofcom says that today close to half of all UK adults (48.5%) own a DAB digital radio set and that 36.3% of all radio listening is on a digital radio. That has been good news for the rising number of digital radio stations including the BBC's 1Xtra and 6 Music and for those who hate listening to channels that are otherwise confined to the medium wave such as Absolute Radio and BBC 5 Live.

“ The industry in the UK is making sure DAB+ radios will become the dominant standard ”

Yet, just as people have started to become familiar with DAB, there has been recent talk of a desire for a renewed push towards DAB+. This system, which was announced in 2007 by the World DMB organisation, goes one better than standard DAB by allowing for good quality audio to be squeezed into less space. Instead of broadcasting at 128Kb/s, the same quality or better audio is available at 48Kb/s or 64Kb/s. With the capacity requirements reduced, proponents of DAB+ say it should lead to lower broadcasting costs and, as a consequence, allow even more radio stations to take to the air, which will increase choice for listeners.

The bad news is that DAB+ doesn't appear to figure in the plans of the UK government and neither is it being adopted across the world. People in Germany, Switzerland and Australia have taken to it in their millions but some such as Sweden have ruled out a switchover to DAB+ altogether much to annoyance of the European Broadcasting Union (EBU), which has labelled the move “short sighted and retrograde”. But the Swedish Green Party culture and democracy minister, Alice Bah Kuhnke fears making 10 million radio receivers obsolete and the government believes a combination of FM broadcasts and internet radio is more than sufficient.

That is not the opinion of the EBU, though. It says there are more than 400 DAB+ services currently available to listeners in Belgium, Czech Republic, Denmark, France, Germany, Ireland, Italy, Malta, Monaco, Norway, Sweden, Switzerland and the Vatican, which could serve an estimated 160 million European listeners – and that it believes the format to be the future of radio.

“By extending the coverage of DAB+, we are meeting the needs of our listeners with all of the additional benefits of digital terrestrial radio,” says EBU director of media, Jean Philip De Tender.

What About Internet Radio?

As well DAB, DAB+ and FM, there is growing competition in the radio sector from internet radio. By streaming audio to computers, tablets, mobiles and compatible radio sets, listeners can enjoy the widest choice of all. Instead of being restricted by location, internet radio lets people enjoy stations from across the world (licensing and advertising issues allowing). It means they can better find an offering that suits their listening needs. Best of all, users are not even restricted to commercial stations – there are amateur channels around too, serving particular niches.

Most broadcasters including the BBC and commercial stations are now seeing radio as a multi-platform offering. Where there is an audience, they will aim to serve. There are some considerations, though. “Consumers worry about their data when listening to internet radio on mobile phones so people tend to listen to online stations via wi-fi in their homes and offices and not on the move,” says Folder Media's creative director Matt Deegan. “But internet radio is great and I'm surprised it doesn't do better than it does especially since it has been around as long as digital radio and given there is more broadband penetration than DAB penetration.”

Internet radio offers more stations and potentially better quality. “But consumers seem to like radio coming from wooden boxes in the kitchens, bathrooms and at work. There are also plenty of radio stations to satisfy the majority of people: in London there are 60 and that's really good. It's true that some will love an Hawaiian station or an indie station from America and that's brilliant. But from the broadcast end, we are not in the business of looking after them.”



▲ Matt Deegan led an experiment to see if listeners would find a DAB+ station in sufficient numbers

“The advantages of DAB+ over analogue listening include clearer sound, more choice of stations and additional services like text, pictures, internet links and geo-referenced data.”

However, while the EBU also points to the existence of DAB+ services in the UK, it would seem that this country is not moving at all quickly towards its adoption. In February this year, the Minister for Culture Communications and Creative Industries, Ed Vaizey made no mention of it when he announced 182



▲ Most vehicle manufacturers including Volkswagen are installing digital radios in their cars

new digital transmitters would be in place by next year (this development would doubling the existing the network and take coverage of digital up from 72- to 91% of the population). And much of this could be due to the fear of a national outcry at the sudden realisation that new sets may well be needed.

In order to receive DAB+ broadcasts, it is important that listeners have a compatible radio. Yet of the 20 million digital radios sold so far, just three million are understood to be equipped for the DAB+ standard. Getting the remaining 17 million listeners to upgrade could prove a politically sensitive issue given that they will, by and large, be happy with what they have. As has been the case in Sweden, forcing the issue is unlikely to be the answer to this reticence.

At the same time, though, there is some tentative experimentation going on. A company called Folder Media began a four-month DAB+ test last September. It broadcast its digital radio station, Fun Kids, on the platform in 64Kbit/s, making use of its multiplex in Wrexham, Chester and Liverpool. It wanted to measure listener response, look at the implications of running DAB and DAB+ services alongside each other and observe the reception differences. Key to this is the advanced audio codec used in DAB+ that, along with enhanced error correction, opens up a greater number of stereo services while reducing the distracting background noises that plague some DAB listening experiences.

"The UK is an interesting challenge," Folder Media's creative director Matt Deegan told us. "There has been a long process of encouraging people to buy digital radio and there is a tick system operating here, which shows people buying a radio that the set is future-ready and will be able to receive not just DAB

and FM but DAB+." Manufacturers are able to apply for the mark to prove they meet the minimum requirements and the idea is that those who buy radios today will not be caught in the trap of having to upgrade in the next few years.

"The industry in the UK is making sure DAB+ radios will become the dominant standard and it will give us the ability to change and move across," Mr Deegan continues. "Quite a lot of radios now carry this tick and most of the cars being sold over the last two or three years have DAB+ as standard. That percentage will increase."

Indeed, the car industry is helping to drive up the install base of DAB+ and yet Digital Radio UK clearly states "there are currently no plans for the UK to start using DAB+", calling the benefits "relatively marginal" and again citing the worry that existing DAB-only sets are not compatible. "Other countries are adopting DAB+ simply because they are launching now and it is the most up to date version available to them," the organisation states on getdigitalradio.com.

Yet Ofcom is still very much open to DAB+. It awarded a second national digital radio multiplex to the Sound Digital consortium, doubling the number of national commercial stations on DAB – one channel of which is being set aside for a DAB+ service, albeit it as a proposed mono 32Kbit/s stream. Still, if Ofcom was more committed to DAB+, it may well have gone for the losing bid by Listen2Digital which was going to have three DAB+ channels. So, is a barrier to progress being erected?

"The BBC and commercial radio are not against DAB+ and they believe it will happen at some point," Mr Deegan continues. "With the option of DAB+, stations can make a choice for themselves based on economics and audience. For Fun Kids, if we wanted

to broadcast in Manchester, for example, we could broadcast in regular DAB or DAB+. For the regular DAB it may cost about £80,000 a year and that would reach 100% of people with a digital radio in Manchester but broadcasting in DAB+ may be £40,000 with a reach of 20%. However, if there is not much room left on a multiplex and it was coming down to not broadcasting or using DAB+ for a smaller reach, then it could become viable and open up a service to another group of people. It's about providing audiences with choice and opportunity to listen."

As more DAB+ sets are bought, the potential reach for the advanced service will increase. Even as it stands, DAB+ can benefit niche markets with lower costs for new stations seeking out a specific audience, which may be persuaded to adopt DAB+ just to listen. "If a radio station wanted to target drivers, then DAB+ becomes a good option because of the number of DAB+ radios being installed in new cars," says Mr Deegan. And, in a way, that is what Folder Media's Fun Kids experiment did.

The station was put on DAB+ without any advertising – "we wanted to see if people stumbled across it," Mr Deegan explains – but when people did land on it, they were in for a treat. "The scrolling text said, 'congratulations, you have found a secret radio station' and it directed people to a website to claim a prize," he continues. "People filled in a five or six-question questionnaire and got some stickers and an entry into a prize draw for a digital radio."

“ The car industry is helping to drive up the install base of DAB+ ”

Folder Media's experiment threw up an unexpected result: "We had a big funnel; we needed people with a DAB+ radio, who would come across Fun Kids, tune in, see the scrolling text, go on the website and fill in the form. We were surprised that 100 people got in touch, which was more than expected," he said. "We found out the vast majority were listening in the car – excluding what I would term the 'enthusiasts' who did seek us out. The listeners also matched the Fun Kids demographic, which is mothers with children. So we had real consumers who saw a new station piping up in their car and liked it. That, to us, was important. We just want people to turn the radio on and get stations they love. I think over the next two or three years we will see more DAB+ searches on radios."

One of the big steps forward for regular DAB is that it is now possible to run a profitable digital radio station. That will, as take-up of digital audio continues, make it viable for DAB+ too.

Future Proofing

If you are looking to buy a digital radio, it is worth making double-sure that it's compatible with DAB+, which so many are these days.

"All Pure's current range are DAB+ out of the box and have been so for a couple of years now," Vicky Hewlett, associate marketing communications director, tells us. "We also have a large number out in the market that are DAB+ upgradeable."

Look out for the digital radio tick mark which you can read more about at tinyurl.com/p7qwycq. Radios need to have DAB, DAB+ and FM as well as a minimum level of receiver sensitivity in order to be granted a tick mark. "Pure was the first to receive the tick mark for its complete range," Ms Hewlett adds.

"It's been an amazing 12 months for in-car DAB – 70% of new cars have it," says Mr Deegan. Next year, projections suggest that more DAB radios will be sold for use in cars than in homes, but getting people already invested in DAB to buy specifically into DAB+ will not be easy and it will rely on people upgrading their existing sets through boredom or the desire to get a radio with more features.

"It's hard for broadcasters to switch to DAB+ since they will disenfranchise people and the majority of listeners are very happy with the sound quality and service of regular DAB. I don't think we will see simulcasting because that is not a good use of bandwidth so it is going to rely on new services adopting it," Mr Deegan explains.

Even so, it would seem that an upgrade to DAB+ is worth pursuing in the long run. The experiment showed that in-car DAB+ services continued to play when DAB signals degraded and there is certainly no issue in terms of the quality of DAB+: in fact, many listeners are counting down the days before it finally gets an official roll out. There has to be a balance between quality and the considerations of listeners when so many people are involved, however.

For now, we're are going to be stuck with a FM/DAB hybrid but, as digital radio penetration increases in cars, the criteria for a digital switchover could be met by 2017. At that point, there will be many more DAB+ radio sets in people's homes, which could in turn herald a fresh look at the future direction for British digital radio. That's a prospect that would be music to many people's ears.

"We want to get to a point where people don't care whether a station is DAB or DAB+," says Mr Deegan. "At some stage, all they will see is the same channel list with nice logos and all that stuff and it will just work for them." **mm**



▲ The tick mark is used for DAB products that are future-ready and can receive the available DAB, DAB+ and FM radio stations



▲ DAB+ may well be available more widely in the UK over the next few years

Virtual Machine Software

David Hayward looks at virtualisation

Virtualisation is the future." That was once the mantra that was driven into me on a regular basis by the head of an IT department some years ago. I used to take his prophetic ramblings with a pinch of salt, nodding and agreeing at the appropriate points in the conversation and trying to avoid eye contact. As it turns out, though, he was right.

Virtualisation in the server room is one of the biggest changes to happen in the last 20-odd years. While a new server instance would have once meant pricing up a physical machine, getting it ordered, having it arrive, then building, configuring, burn-in testing and configuring some more before aggravating your hernia by manhandling it into its allotted space within the actual server room, virtualisation could be done in mere minutes.

Imagine the scenario: the marketing department wants a server to centrally store all their contacts, spreadsheets and photos of the Christmas party. It has to be accessible externally, by on-the-road staffers, and the more sober of the team need to be able to administer it to a higher degree than usual. The solution these days is simple. Just create a new virtual OS in the cluster, call it Marketing and assign the admins.

The virtual server can be backed up easier, maintained easier and restored within seconds should something ever go wrong with it. Virtualisation is the way forward.

Thankfully, it doesn't have to be limited to the workplace; us mere mortals can enjoy virtualisation just as much as demi-god network administrators. Most of us already do, with a Linux test virtual machine within our usual Windows build- or vice versa. Anyway, let's have a quick look at a handful of virtual machine programs to see what's available.

VirtualBox

Oracle's VirtualBox has been available in one form or another for around eight years now. It started off as Innotek's VirtualBox, which was then acquired by Sun Microsystems, which in turn was bought by Oracle, and the rest is history.

It's an extremely easy virtual machine to use, set up and configure, and in most cases it's reasonably stable and powerful enough for the average user to enjoy the benefits of virtualisation.

More experienced or advanced users may find it a little limiting, in the way that it emulates certain hardware (if emulate is the right description). But VirtualBox prides itself on being more friendly than most of the competition.

It's free and is available at goo.gl/5Jmhv0, together with the extra features and any documentation or instructions.

VMware

If VirtualBox is seen as the beginner's virtual machine software, then VMware is for the advanced and professional user.

VMware Player and VMware Workstation are used the world over by companies, training organisations and home users who want their operating system to run in as close a real-life environment as possible, while still having the benefits of being virtual.

The free solution, VMware Player is a cut-down version of the enterprise-powered VMware Workstation, but it's still an extremely capable virtual machine program. Setting up a virtual machine is easy enough, just as with VirtualBox, but behind the scenes you can do a whole lot more and tweak the machine.

For more information and to get hold of the downloads, go to goo.gl/RqanaX.

Parallels

Parallels isn't a virtual machine that many PC users will have heard of before, chiefly because it's designed for Mac users to run Windows on their wonderfully stylish and super-expensive machines.

It's a quick, easy and powerful solution for Mac users who need a copy of Windows at hand for testing, but it's also a lot more involved than most other, usual virtual machine programs.

The newest version, Desktop 10, allows Mac users to right-click a number in Internet Explorer within the Windows VM and call it via their iPhone. There's also iMessage and SMS text sharing from

Windows Virtual PC details

If you're interested in exactly what Windows Virtual PC can be run on and with, here's some info directly from Microsoft:

"Windows Virtual PC is the latest Microsoft virtualisation technology. You can use it to run more than one operating system at the same time on one computer and to run many productivity applications in a virtual Windows environment, with a single click, directly from a computer running Windows 7.

Windows Virtual PC supports the following host and guest operating systems:

- *Host: Windows 7 Home Basic, Windows 7 Home Premium, Windows 7 Professional, Windows 7 Ultimate, Windows 7 Enterprise.*
- *Guest: Windows XP Service Pack 3 (SP3) Professional, Windows Vista Enterprise Service Pack 1 (SP1), Windows Vista Ultimate Service Pack 1 (SP1), Windows Vista Business Service Pack 1 (SP1), Windows 7 Professional, Windows 7 Ultimate, Windows 7 Enterprise."*

So now you know.



▲ VirtualBox on Windows 7, running Windows 3.11



▲ Parallels for the Mac, running multiple Windows VMs

Windows and support for iCloud Drive and iPhoto Library interaction, and you can cross share files, images, video and just about everything else from the Windows VM to the Mac and its connect iAccounts and iWhatever else.

It's interesting stuff, but it's not free. However, more information can be found at goo.gl/4b5mNk.

QEMU

QEMU is an exceptionally powerful virtualisation tool, but it's not the easiest to get to grips with.

Its main use is within Linux, where it can be configured to emulate nigh on every platform imaginable. There are Windows-based VMs for QEMU, Mac VMs, even Android and other ARM-based VMs like the Raspberry Pi.

Getting a VM up and running can often be a hit or miss affair, and frustration levels do rise if a virtual machine refuses to load the way you expect. But perseverance is the key, and with some clever Googling and asking the right questions on forums, you'll end up with one of the most powerful and customisable virtual machines ever. Incidentally, we once managed to get Windows 3.11 and DOS 6.22 running in QEMU from a Raspberry Pi.

QEMU may not look as pretty as VirtualBox or VMware, but it allows you to push the limits of virtualisation and create VMs that behave how you want them to. For more information, take a look at the QEMU main page at goo.gl/XMGsCv.

Windows Virtual PC

Windows Virtual PC gets a lot of stick from the virtualisation community, which is a little unfair as it's actually quite good.



▲ Windows 3.11 on the Raspberry Pi using QEMU, just for the heck of it

True, it's not designed to run a copy of Linux under Windows 7, nor will it allow you to tweak the guest operating system environment in the same way that the other examples we've looked at can. But for simply running an older version of Windows within a later version of Windows, which some people want to do, it's perfectly fine.

Windows Virtual PC has been freely available since 2006 and has evolved into its modern incarnation as a VM product that can run on Windows 7 PCs (Home Basic, Home Premium, Professional, Ultimate and so on) as the host machine, with guest operating systems that include XP, Vista and Windows 7, of varying service packs and editions.

It's pretty small and basic but capable. For more information and the download link, go to goo.gl/0JfQXy and have a read of what's needed.

Virtualising Everything

There are probably more virtual machine examples available, but since we're short on space, we'll let you explore the rest. Nevertheless, these five will take some time to digest and explore. mm

How Copyright Works

(And How To Find Genuinely Free Stuff)

Keir Thomas explains the rules of copyright and how to legally find and use free images, audio and movie files for your projects

To paraphrase the Nicole Kidman in the movie *To Die For*, ‘You aren’t really anybody if you’re not on the internet.’

The days of people wanting their own homepage have perhaps disappeared down the drainpipe of history, but they’ve been replaced by a desire to create things bigger in scope – a YouTube video, perhaps, or a PDF offered for download. You might wonder where you can find pictures, music and video clips to use to give everything a bit more pizzazz. These are plentiful across the internet, of course, but whether you can freely use them is another matter. You need to consider copyright and the licensing terms of the item. If you ignore these basic hurdles you can very easily find yourself taking a nasty fall.

In other words, unless you know how copyright and licensing works, then you won’t know what’s legal for you to use in your creations. So excuse us if in this feature we first enroll you in a brief copyright lesson. Don’t worry – we keep it simple.

Copyright For Beginners

On the face of it copyright is blisteringly straightforward. Most items created by a person or business (images, videos and audio, for example) are copyrighted. The only exception is when the copyright has expired. But that really is all there is to it. Things like Creative Commons licences, discussed below, build on this principle, but they don’t take it away.

The date until copyright expires varies from country to country but here in the UK it currently lasts for an author’s lifetime, plus 50 or 70 years (see goo.gl/hnHlq7 for specifics). Because some countries have shorter terms than this, strange situations arise such as with the works of George Orwell, whose novels are still covered by copyright in most countries, but not in Australia, where his books can be freely downloaded (see the University of Adelaide’s note at goo.gl/ZPCHdR).

However, copyright applies worldwide. It’s recognised automatically within any country that’s signed up to the World Intellectual Property Organisation (WIPO), a part of the United Nations that enforces the Berne Convention. In other words, that’s every major country. If you

create something in the UK, then in the US the copyright is recognised automatically – and vice versa.

As a UK citizen, anything you create is automatically copyrighted. Scribble a smiley face on a Post It note, and that image is your copyright, automatically. Write a poem about trees in the breeze, and it’s your copyright from the instant the ink leaves the pen.

Misconceptions

This brings us to the first popular misconception about copyright, which is that items aren’t copyright unless there’s a brief sentence saying so – ‘© 2015 John Smith,’ for example. Nope. Copyright is automatic, and there’s no strict need for this message. Always assume everything you encounter is copyrighted.

The second misconception is that stuff on the internet is automatically in the public domain. Even certain Princess Di-obsessed newspapers have been known to skid on the banana of this mistruth, which perhaps arises through a misunderstanding of what constitutes ‘public domain’. In fact, it doesn’t have much of a legal basis but is widely understood to mean items whose copyright has expired. Examples include old novels found at the Gutenberg ebook site, or movies from the early part of the 20th century. Arguably the concept can be extended to items for which the creator simply isn’t around to enforce their copyright – a novel whose author has died and whose publisher disappeared without transferring the rights, or an old computer game for which the company has gone bust and whose assets weren’t bought by another organisation. This can be very shaky ground, however, as any retro gaming enthusiast will tell you.

Some people have excused the theft of images, videos and audio by arguing that the internet is public and also a domain where creative works can be found, so therefore anything found on the internet is public domain. This just isn’t true and has led to gainful employment for many lawyers – although typically the first course of action is a simple cease and desist email from the copyright holder requesting removal.

GOV.UK Search

Home Business and self-employed Patents, trade marks, copyright and designs

How copyright protects your work

1. Overview
2. How long copyright lasts
3. License and sell your copyright
4. Stop people using your work

2. How long copyright lasts

Copyright protection starts as soon as a work is created. Once your copyright has expired, anyone can use or copy your work.

The length of copyright depends on the type of work.

| Type of work | How long copyright usually lasts |
|--|--|
| Written, dramatic, musical and artistic work | 70 years after the author's death |
| Sound and music recording | 70 years from when it's first published |
| Films | 70 years after the death of the director, screenplay author and composer |
| Broadcasts | 50 years from when it's first broadcast |
| Layout of published editions of written work | 75 years from when it's first published |

Patents, trade marks, copyright and designs
Intellectual property and your work
Using somebody else's intellectual property
More

Elsewhere on GOV.UK
Licensing bodies and collecting societies

▲ Copyright terms vary around the world, and in the UK it can get quite confusing, although the government is keen to explain more

The third copyright misconception is what might be called The YouTube Fallacy. If you use a clip from a Disney cartoon and add © Disney at the beginning or end, that doesn't automatically provide permission to use that item. Acknowledging copyright means nothing. The copyright holder must give you explicit permission before you use stuff.

A final misconception about copyright is that items created trivially (snapshots of an individual, for example, or a 30-second YouTube video captured on a mobile phone) aren't covered by copyright. There really isn't a hammer big enough to bash home the truth that everything is covered by copyright, regardless of how it was created, who created it or how easy (or complicated!) it was to create it.

Exceptions

If you want to use something online, then you must track down the copyright holder and get permission. This permission is usually granted via a licence agreement, and this usually, although not always, involves payment of a fee, known as a royalty.

Sometimes copyright material is used online without payment with the claim it's fair use. This is a clause in US copyright law that allows items to be used without the copyright holder's permission, provided it's for education purposes, parody, criticism or a few other explicitly named undertakings. Quite how fair use can be used is a minefield, but it's one that's been successfully mapped by lawyers. However, it far from covers all appropriated usage of copyright material. Nowhere near.

Here in the UK, we've simultaneously suffered from two misconceptions regarding fair use. The first is that the US laws apply to us too if we put stuff on the internet. They don't. If you're sitting in the UK when you upload a copyrighted video to your .com website that's located on a US server, then the laws of the UK take precedence – although you could also get sued in the US courts in addition!

British copyright law does have a little known 'fair dealing' clause that allows for copyright exceptions when it comes to criticism, reporting of current events and study. There are all kinds of limitations and provisos that mean fair dealing is a hazy shade of its American equivalent and virtually meaningless for most of us – which is why you might be learning about it for the first time here.

YouTube Search

Disney The Black Arrow Original Rare Movie *NO COPYRIGHT INTENDED*

Published on 15 May 2014
This is the full length film of an original Disney classic about the war of the roses and the battle over land and over a beautiful girl. Enjoy! :)

119,676 views

▲ Simply adding a copyright acknowledgement doesn't make it fine and dandy to use copyright material. You must get explicit permission first

It's not all frowny emoticons. Last year, UK law was amended to clearly extend fair dealing to caricature, parody or pastiche. This was hailed by many as a necessary loosening of otherwise strict copyright laws in the internet age and has led to the legitimisation of satirists such as Cassette Boy, who creates hugely popular video montages from news clips.

Copyleft

As mentioned, if you create an item and want to make money from it, then you'll probably have to license it to others via a legal contract, in return for payments called royalties. (Facebook, Instagram et al are an exception – look at the terms and conditions and you'll find that you

cassetteboy 149,007 subscribers

Home Videos Playlists Channels Discussion About

Uploads Date added (newest - oldest) Grid

- Cassetteboy - Emperor's New Clothes rap 1,425,451 views - 4 months ago
- Cassetteboy - Cameron's New Conference Rap 3,822,479 views - 9 months ago
- Cassetteboy vs David Attenborough 755,195 views - 1 year ago
- Cassetteboy vs DJ Rubbish - Edinburgh Fringe Festival... 1,162,123 views - 2 years ago
- Cassetteboy & Amnesty International vs The Arms... 356,415 views - 2 years ago
- Cassetteboy vs Obama vs Romney - Deleted Scenes 222,569 views - 2 years ago
- MI7 Romney Quits! 340,007 views - 2 years ago
- Boris Johnson's Olympic Welcome 1,170,876 views - 2 years ago
- Cassetteboy vs The News 3,122,944 views - 2 years ago
- Cassetteboy in 2011 424,213 views - 2 years ago
- Cassetteboy vs. The Hairy Bikers 312,005 views - 4 years ago
- Harry Potter and the X-Rated Trailer 1,190,523 views - 4 years ago

▲ Online satirists such as Cassette Boy have been legitimised by a loosening of the copyright law last year, but its scope is pretty narrow

automatically license whatever you upload or type into those services for worldwide distribution, free of charge and forever.)

However, the rise of computing has subverted the idea of licensing content and brought about so-called copyleft licences, such as the Creative Commons licences, or open source/free software licences used for computer software such as the GNU Public Licence (GPL). In this case the licence makes the item available for the world at large to build on or to use however they wish, without charge. The latter perhaps comes closest to what most people erroneously understand as public domain, as mentioned earlier. However, the items are still copyrighted even if they're licenced as copyleft. It's just that the creator has contractually made the item free for use. Crucially, they haven't 'given up' their copyright.

Although no money typically changes hands for use of copyleft items, you pay a price by meeting the requirements of the copyleft licence terms. For things other than software, Creative Commons (CC) licences are the most popular, and there are different versions with three components, any of which might be included in a particular licence agreement.

The first component relates to whether the item is to be used commercially – that is, you want to either make money from something that includes the item or use it as part of a larger commercial enterprise such as on the website of your business. An example of non-commercial use would be using the item in a church newsletter that the clergy gives away or even sells but that is from an enterprise isn't related to commerce in the usual sense.

Put simply, some people who create items licenced with CC just don't want others to make money using them although often you can contact the person directly to arrange your own terms if you really want to use the item commercially.

The second factor is whether you need to provide a credit for the creator of the item, which is to say, attribution. If attribution is required, it's usually no big deal, but it'll require you to add a caption to any CC-licensed photo you use or a credit sequence to a video.

The third factor is whether you're going to take the item and use it unmodified (placing a CC-licensed picture on your website, for example) or whether you're going to create something new based on that item. You might Photoshop an image of a horse to make it look like a unicorn, for example. This is referred to as creating a derivative.

To cut short a potentially nebulous explanation, the best kind of CC licence if you simply want image, sound or video files for a project is CC0 – commonly referred to as 'no rights reserved.' The item still has copyright applied to it (everything always does!), but with the CC0 licence the creator waives all typical copyright requirements. There's not even any need to provide attribution. You just grab the item, use it and forget about it.

How To Search

Another way to describe CC0 stuff is to call it royalty free, and this is important because it forms the basis of fruitful online searches if you want free images, audio and video. In fact, there are a number of search terms that are useful:

- CC0
- CC BY
- CC BY-SA
- Royalty free
- Labelled for reuse

As for where to search, most people are familiar with the likes of Google Image Search (images.google.com), which lets you search specifically for images. Just add in one of the phrases above, alongside the name of what you require: 'oak tree cc0', for example, or 'unicorn



▲ Items licensed under Creative Commons let you use them, but it isn't a free-for-all, and there may still be restrictions



02488887
Nad Wess | Dreamstime.com

Download from
Dreamstime.com
This watermarked image is for previewing purposes only.

▲ Creative Commons images might be free to use but you might need to provide a credit for the original artist

royalty free'. For video you can use video.google.com, although beware that results tend to be biased towards Google's own YouTube platform, and to download items you'll probably need to use a dedicated downloader extension like Video Downloader Professional: goo.gl/Gud0AD.

When you find a result you like, visit the site and make sure that it is indeed licensed in an acceptable way. Tread carefully unless the terms are explicitly stated. If the item is to be used for a print publication or DVD pressing that it would be costly to redo, then to ensure certainty in the licensing terms you might use a reverse image search engine like TinEye (tinEye.com). This lets you input an image to search for, rather than text, and will let you ensure the image isn't listed for sale on commercial stock media sites like iStock.com. Indeed, if you want belts-and-braces confidence, then you might even choose to search sites like [iStock](http://iStock.com) using the original term to see if the item surfaces.

Unfortunately, because of the misunderstandings of what constitutes copyright, as discussed earlier, it's not uncommon for people to offer an item free for use without realising they shouldn't do so. Some people offer items with the belief that if the item is



▲ The advanced component of Google Image Search lets you specifically filter images that meet specific licence requirements

restrictively copyrighted, then it's down to the copyright holder to get in touch and tell them so, in which event they'll remove it. Once again, this is a fallacy – albeit an effective way of collating online content – but it's dangerous for those who use materials the site offers.

Few people are familiar with Google's advanced search page ([google.com/advanced_search](#)) which, among other things, lets you filter by usage rights, and the options essentially mirror the Creative Commons licence options.

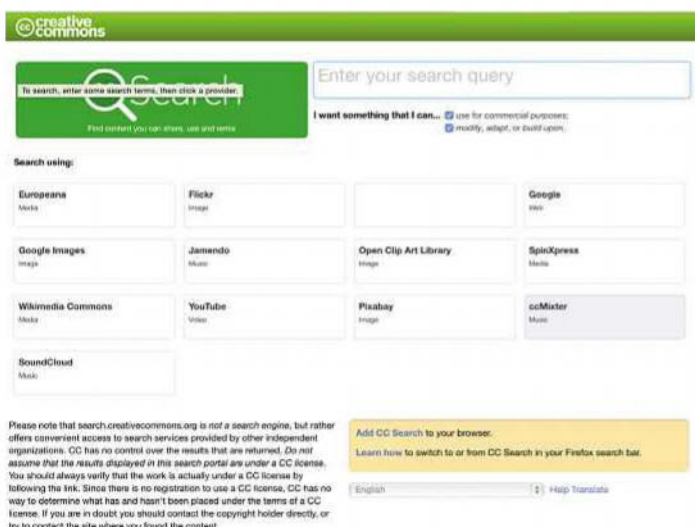
Google isn't the only search in town, of course, and most major search engines have their own media-finding offshoots – [uk.images.search.yahoo.com](#), for example. Bing has its own image search too but, in typical Microsoft fashion, we can't provide a link. Just visit [bing.com](#) and click the Images link at the top of the screen.

Dedicated Search Engines

Needless to say, the desire to track down CC0 and royalty-free stuff is widespread, and several dedicated sites have arisen to cater for any requirement – image, audio, video and more. There's also a desire to track down professional-level material – high-res photography, for example or 1080p video files that are offered for easy download and don't need to be ripped. Most search engines discussed previously are designed for casual users who don't really care about such issues.

The most useful solution in both cases is the official Creative Commons search engine: [search.creativecommons.org](#). This is actually a meta-engine that searches other sites, which you can choose between, and therefore it's also ideal to learn of sites that collate free materials.

Fagan Finder ([faganfinder.com](#)) is another meta-engine that lets you search specifically for images, video, audio and more (just like



▲ Because it's not unusual for people to want free stuff, Creative Commons search engines have arisen and let you search for CC-licensed stuff at various sites

| Name | URL | Description |
|-------------------------------|--|---|
| Pixabay | pixabay.com | Free high-quality images |
| MorgueFile | morguefile.com | Free high-resolution images |
| Free Images | freeimages.com | Free stock images |
| Online Logo Maker | onlinelogomaker.com | Generate your own free logo from template designs |
| British Film Council Archives | film.britishcouncil.org/resources/archives/ | Links to archive video clips and more |
| KFTV | kftv.com/category/stock-footage-libraries/country/uk | Links to stock video footage |
| BBC Motion Gallery | gettyimages.co.uk/bbcmotiongallery | Clips offered via the BBC for free online use |
| BBC Worldwide Learning | bbcworldwidelearning.com | Clips offered by the BBC for educational purposes |
| Archive.org | archive.org/details/audio | Archive.org's collection of free audio files, including contemporary material |
| SoundCloud | soundcloud.com | Arguably the biggest collection of audio and music online |
| Free Stock Music | freestockmusic.com | Free production-quality music for use in projects |
| Google Fonts | google.com/fonts | Open source fonts created by Google |
| Open Font Library | openfontlibrary.org | A library of open source fonts |
| Envato | market.envato.com | Digital content offered from a variety of sites, some free, with a free number of commercially sold items each month once you sign up |

the link at the top of the screen) and again lists quite a few sites that you might choose to bookmark. Unfortunately, it has no filter to find specifically free-to-use items, so you'll need to dig down into the results to check for yourself.

FindSounds ([findsounds.com](#)) focuses specifically on audio and lets you specify quality settings, such as the bit resolution and sample rate. SoundCloud is arguably the biggest collection of audio online, although only a fraction is free. However, it provides a useful link to sites where royalty-free audio can be found: [goo.gl/xZIOvO](#).

It isn't just audio, pictures and video that are covered by copyleft licenses. You might want to find an interesting font to use in your project, and if so, the same search skills described above apply, although because fonts are often licenced under software licences like GPL or MIT, you might choose to add in those terms instead. Do be careful, though – it's extremely common for people to create copies of commercial font files but simply change the name and/or metadata within the font. Organisations that create commercial fonts can be ferocious in enforcing copyright. Additionally, some people create new font designs from scratch that are essentially clones of existing commercial fonts. The legal situation here is a little less certain, but you could still get into trouble. Be aware too that fonts can have strange licensing terms that mean they can be used on screen but not for printing or embedding with PDFs. A Microsoft technical note explains how you can view this information: [goo.gl/F7WtvN](#). [mm](#)



Car Hack Leads To Recall

E-sports Star Admits To Drugs

Top league takes anti-doping strategy

It's a shame to have to report that e-sports has made the headlines for all the wrong reasons this week, after one of the top players on the ever-growing circuit has admitted to taking a performance-enhancing drug at a tournament earlier this year.

Semphis, or Kory Friesen as he is known outside of the e-sports world, took to YouTube to confess his use of ADHD medicine, Adderall, also claiming that he's far from alone. The drug is thought to improve reaction times and concentration, and therefore help with performance on the gaming field.

Seemingly as a reaction to this revelation, major e-sports league the Electronic Sports League has announced that it has launched an anti-doping initiative to stamp out this kind of activity. It's such a shame that drugs have to be so closely associated with sporting achievements, even in the e-sports world.

Amazon Launches Prime Music In UK

Only a million songs in catalogue

Amazon Prime members in the UK now have access to the company's Prime Music streaming service. However, while the new addition is accompanied by the strapline "Your Music Collection Just Got A Lot Bigger", perhaps a more apt strap would have been "Your Music Collection Just Gained A Few Albums You Might Be Interested In". With a little over a million songs in its catalogue, the reality is that Prime Music's offer pales in comparison to that of Spotify or the recently-released Apple Music. The promise of "hundreds" playlists created by Amazon does little to get one excited either.

As an addition to the subscription-based Prime service, however, this is a welcome development and it could yet sway some people who were previously tempted to sign up for the £79-a-year membership.

amazon.co.uk[®]

Affects 1.4 million vehicles

It's a measure of the world we live in when a car is recalled because of a computer problem rather than a mechanical one. Reporters at *Wired* magazine broke the news that hackers could control a Jeep Cherokee via its web-connected entertainment system and, as a consequence of the hackers' discovery, Fiat Chrysler has since issued a voluntary safety recall which affects 1.4

million vehicles in the States – including Jeeps, Dodges and Chryslers.

The recall will give their technical bods a chance to fix things in affected vehicles, at – no doubt – a considerable cost to their employers, both in terms of their time and the bad publicity the find has generated. Indeed, following the announcement one of the researchers apparently rather cheekily tweeted “I wonder what is cheaper, designing secure cars or doing recalls?”

It's an interesting question, no doubt.



A little while ago, I upgraded my Macbook with a 256GB SSD, having become increasingly frustrated with the ever slowing performance of its hard drive (predictably, huge drops in speed came about just after updating OS X).

But rather than removing the mechanical disk, I kept it, and jettisoned the DVD drive instead.

At first this seemed strange, but when I thought about it, I realised it had actually been several months since I last had call to use an optical disc.

Of course, Apple and many other laptop makers have already made this decision for most of us, by no longer including optical drives with their computers.

That's not to say DVDs aren't still useful, though, but for me optical drives really don't justify a permanent place in my computer any more.

How about you?

Until next time,

Anthony

Editor

Apple Warns Over Data Corruption

Macbook Pro owners handed firmware update

Proud owners of the not-cheap mid-2015 Macbook Pro models have been the kind recipients of a firmware update from Apple citing potential issues with the possible corruption of data.

The problem apparently surrounds the model's flash storage and, while Apple stated that the corruption was ultimately only a problem in “rare cases”, it's understandably treating this seriously. Of course, it's not the only problem users have encountered with the laptop; thousands of owners have also

complained over stains that have appeared on its rather snazzy Retina screen.

More problems than you'd like to see in a computer costing, at least, £999.



Meanwhile... On The Internet...

We're largely inured to the devious machinations of hackers these days; then, once in a while, even the most savvy of hack-watchers raises an eyebrow at a new form of attack. To wit: Hammertoss, a seemingly Russian-derived malware tactic that uses common sites and services to help its attempts to compromise systems and remain undiscovered while doing so.

Found by researchers at FireEye and explained by its team in an informative YouTube video (tinyurl.com/MMnet74a), Hammertoss uses a series of discrete actions to complete its task, all performed in a manner that resembles human activity on a network and therefore confounds many standard defence tactics. The malware, a piece of work attributed to a group known as APT29 (tinyurl.com/MMnet74b), first retrieves a link to an image from a randomly generated Twitter account, then uses steganography (tinyurl.com/MMnet74c) to extract instructions from the image. After completing whatever work it's been tasked to perform, it's then capable of uploading the information it has gained to commonly used cloud storage facilities.

This method, as FireEye puts it "limits the amount of evidence that network defenders can utilise to understand the tool and the threat factor behind it."

Crafty, very crafty...

Before we move on to one of the weirder hacking stories we've ever had to report on, we'd like to point you in the direction of the story concerning headline-grabbing work done by Charlie Miller and Chris Valasek on proving that it was possible to hack and shut down a Jeep Cherokee using the uConnect cellular network in the USA (tinyurl.com/MMnet74d) – which has led to a massive recall of vehicles. It's a year's worth of work on their part that has bought them headlines across the globe, and begun a very real debate about whether the internet of things is really a good thing (tinyurl.com/MMnet74e).

Here, though, we want to focus on another story, concerning the ability to hack cars that have no connection to the internet – via, of all things, a DAB radio (tinyurl.com/MMnet74f). What's more, NCC Group, the team behind the find, allege that with a box of tricks and a laptop, the method they use could be used to attack multiple vehicles. Super scary (tinyurl.com/MMnet74g).

The much-maligned world of memes is something we dip into on a regular basis because, as it's often been pointed out to us 'We love a good meme' – we just can't help ourselves. The one that caught our eye was the **#PrinceCharlesBeingAttackedByThings** hashtag instigated by comedy site The Poke (tinyurl.com/MMnet74h).

It all kicked off with a photo of the air to our throne recoiling from a particularly unhappy eagle, which itself was attempting to get away from its handler. However, when the internet got a hold of it (tinyurl.com/MMnet74i) it became a Photoshop showdown the likes of which we've not seen in a while – featuring cameos from Miley Cyrus, John Travolta, Boris Johnson and Aussie cricketer Mitchell Johnson.

Amazingly, it's taken five-odd years – and more spin-offs than we have fingers – for Rovio to release a died-in-the-wool sequel to *Angry Birds*... But it's here now. The question, really, is: does anyone care?

Apparently, they do... and though the general reviewer response to the game has been positive (it's averaging 4.6 on the Play store, for what it's worth), there have been a few raised eyebrows about Rovio's decision to base the game on the ever-so-popular-yet-everyone-seems-to-hate-it 'freemium' model (tinyurl.com/MMnet74j) rather than the traditional pay once and it's yours way the game has worked before. Whether or not this new game will instigate the same level of obsession that the original did remains to be seen – though it will have a movie to further boost its profile in the next year (tinyurl.com/MMnet74k).

We've written umpteen paragraphs about the problems of Reddit recently – how it appears to be experiencing growing pains that have put it at odds with the libertarian leanings of its oh-so-essential user base. It's not the only youngish internet phenomenon struggling to deal with the big wild world of business, however. We need to talk about *Gawker*.

A darling of the new media revolution, *Gawker* recently faced a backlash after publishing – and subsequently taking down – revelations about the private life of a Conde Naste executive, a decision that cost it its editor-in-chief. In the wake of this, it appears to be looking closely at how it works as it moves into what chief executive Nick Denton refers to as its "second act" (tinyurl.com/MMnet74l) – a problem increasingly plaguing new media companies becoming not-so-new media, it would seem.

.AVWhy?

Videos For Your Eyes...
Not Necessarily For Your Brain

While a lot of our friends were having a little squee at Daniel Craig, Christopher Guest et al in the new trailer for *Spectre* – aka Bond 24 – we were happier to laugh at this little YouTube beauty that mashes up Bond 22 with an 'unofficial' Bond film that shares its name, *Casino Royale* (tinyurl.com/MMnet74m). Film buffs will know that a deal was done between MGM and Sony to get back the rights to the book before the 2006 remake came out (with MGM giving over its partial rights to *Spiderman* in return) as it attempted to erase the memory of the swinging, anarchic, oh-so-60s take on the storyline.



Caption Competition



Two weeks ago, we left you with this little chap. Let's see what you all made of it:

- **David Jackson:** "How can I write the complete works of Shakespeare with this rubbish spellchecker?"
- **wyliecoyoteuk:** "The Windows 8 GUI testing team finally found a user who liked Metro."
- **doctoryorkie:** "Never mind broken links. I've just found the missing link."
- **doctoryorkie:** "Who has been monkeying around with my settings?"
- **alanrwood:** "Leave me alone, I'm halfway through writing the complete works of Shakespeare."
- **BullStuff:** "Touch screen or touch pad? This is driving me bananas!"
- **TeckkieGuy:** "At Last! I've finally finished a Midsummers Nights Dream."
- **TeckkieGuy:** "Wow! Touchscreen, Windows 10, to think my grandfather had to use typewriters."
- **wyliecoyoteuk:** "Still can't find the any key."
- **Darren LeWarne:** "I found the Monkees on iTunes."
- **Rich Mason:** "Oh, it says 'Acer', not 'Aper'!"

The winner this week is Tom Downs, with "Forget the Any key. I've just found the Mon-key!"

To enter this week, head to the 'Other Stuff' section of our forum (forum.micromart.co.uk) or email us via caption@micromart.co.uk and say something funny (but not too rude) about the picture below.



Uber In Legal Wrangle In Canada

Multi-million-dollar damages claim by taxi drivers

A taxi driver in the mighty Canadian city of Toronto has launched a legal action against Uber. Reportedly seeking around £198m in damages on top of an injunction to put an end to the Uber booking app operating in the Ontario province, the legal action on behalf of all taxi drivers in the area is

complaining about Uber's services having taken away their business. Uber, as you may or may not know, has also recently been fined \$7.3m in a Californian court for failing to comply with laws on sharing data on its business.

Should this latest court matter be upheld, it would be another significant ruling against the controversial service.

Smartwatches' Security Flaws Exposed

All tested models at risk

A study from HP Fortify that looked at 10 popular smartwatches has revealed that they – shock horror – contain a bunch of security flaws making them completely open to cyber attacks.

Every one of the watches looked at contained what HP is calling "significant" security vulnerabilities, including insufficient authentication, poor encryption and privacy worries. Cannily, HP hasn't named the

smartwatches concerned in its study, however – though we hope they've informed the company's concerned.

Specific issues included 30% of the watches tested being vulnerable to account harvesting, and seven of the ten having issues with protecting firmware updates. With all of the watches containing personal information, the general issue of privacy is also something of a bother according to HP.

Snippets!

500m Streams A Week

The Official Charts Company has revealed that music streaming in the UK has passed the 500m streams a week mark for the first time.

Official figures show that there were 505,849,000 streams during the week ending 16 July which is significant as it is double the number of the same period the previous year. As for the total number of streams during 2015 to date, we're talking 11.5bn audio streams, up by 80% on the same period in 2014.

Usual Suspects Top Sales

According to data from the latest IDC Worldwide Quarterly Mobile Phone Tracker report, Apple and Samsung once again come out on top in terms of smartphone sales. The second quarter of the this year saw 337.2m smartphones shipped around the globe, which is an 11-plus percent rise on the same period last year.

Unsurprisingly, Samsung and Apple again lead the way with older, cheaper Galaxy models helping to keep Samsung at the very top of the tree.

Robots Taking Over!

Do you own a robot vacuum cleaner? You do? Then you're far from the only one.

Turns out that demand for household robots is going through the roof right now, with a 1600% increase in robot lawnmowers compared with five years ago. The ridiculous figure stems from a slice of research put together by Idealo, looking into demand and price trends in robotic vacuum cleaners and lawn mowers – which also reveals that one in six of 'us' would consider a robotic lawn mower and one in ten a vacuum cleaner made of chips and bits.

So now you know.

Man Plays Half-Life On Smartwatch

Congratulations, Sir

We love a good mod story and the latest tale of a chap who wanted to place a traditional videogame title on to a very non-traditional platform comes courtesy of Dave Bennett. Unspectacular name, spectacular achievement.

For, you see Dave has managed to place a version of *Half-Life* onto an Android

LG G Watch, meaning that it's entirely possible to go into battle on a screen less than 2" in size. Marvellous.

Dave used the SDLash app to achieve this mini marvel, telling readers of his blog that he has managed framerates as high as 30FPS – and as low as 2FPS. He also brilliantly discusses in an associated video tutorial about the inherent issues of taking on

this particular mod, including the problem of going back to the previous window whenever he swipes to the left and also the difficulty in using the touchscreen controls on such a teeny, tiny screen.

You can catch up with his marvellous work at tinyurl.com/o396zv6 – where you can also see the game in action. Honestly, this is something that's worth watching.

Nintendo Ditches Wii U's TVii

Video service closes indefinitely

Let us take you back to the heady days of 2012. It was in that very year that an eager Nintendo launched its Wii U console, kitted out with a TVii feature that would "transform" how people watched and engaged with TV shows, movies and the like. With its own dedicated button on the Wii U Gamepad, this was a key feature of the console and something that would help it to stand out from the competition.

Spin on three years and Nintendo has dumped it. Permanently. The video service was potentially quite interesting, allowing users to search through video services directly via the app but Nintendo has pulled it to "focus our resources on other projects".

That's a shame, really, but serves as confirmation that the console is seen by consumers – at least those that opted for Wii's successor – as a gaming device and little else.



Twin Cooler From Alpenfohn

Mini-ITX and Micro-ATX supporters

Mini-ITX and Micro-ATX tower builders may like to hear about this brand new premium-class twin tower cooler from Alpenfohn. Designed, as these things usually are, to offer "outstanding performance" the Atlas Cooler comes with a dual-asymmetrical design, which you can see for yourselves here, that supports all memory modules, even those requiring large/tall heat spreaders.

The aerodynamic shape of the fins offers fantastic performance from the two Wing Boost 2

fans, while the convex surface of the base plate helps thermal contact to the CPU.

Coming in a maximum size of 125mm, this also comes with Permafrost ultra-high-performance thermal grease and you can pick one up from www.overclockers.co.uk.



Butt Dial Calls Not Private

US Court case rules against butt diallers

In one of those strange old cases that crops up every now and then, a US Court of Appeals has decided to rule that any so-called 'butt dials' you may accidentally make are not your own property.

The case concerns one James Huff who accidentally made a call from his pocket, which allowed a conversation he was having to be overheard by assistant Carol Spaw. It turns out that Spaw took notes of what he was saying

while recording it, as he was reportedly discussing the possible sacking of a CEO.

Having then allegedly passed the recordings on to members of the board, Spaw was subsequently sued by Huff saying that these were private conversations. Having lost the case, the ruling stated that as Huff failed to secure his own phone (i.e. by locking it or turning it off) it was his fault, essentially meaning that we should all watch what we say, even when our phones are safe in our pockets.

Tomb Raider Timed Exclusive Coming To PC

Release due for early next year

Non-Xbox owners keen to get their hands on the *Rise Of The Tomb Raider* game coming out of the Square Enix stable can breathe a sigh of relief as it seems that the timed exclusive for the console won't be exclusive for very long at all.

Subsequent to the November, 10th Xbox launch, Square Enix has said the PC version of the game will be out

early next year, with a PS4 one planned for "holiday 2016". It's interesting, given the high-profile hoo-hah surrounding the initial announcement that it would be an Xbox exclusive, only then to be confirmed as a time-limited offer.

Presumably recognising that more platforms means more money, this appears to rather confirm that exclusivity really means very little when it comes to matters of money.

Argos Launches Phones For Vouchers Scheme

Is it really the best deal, though?

Thanks to a partnership with 'circular economy' specialist WRAP, Argos is now encouraging customers to bring in their old mobile phones and tablets in return for in-store gift vouchers. You can now walk into any Argos store, drop off your unwanted tech for an instant quote and trade it in for an Argos gift card to spend on anything in store.

As for your old gadgets, they're refurbished in the UK and re-sold. Convenience is the key driver on this one and we can certainly imagine a fair few shoppers taking Argos up on the offer.

The slight problem is that you may be able to get a better price at the high-street stores and online options that are already offering similar cash-for-gadgets services. Still, nice to have options.

No CD/DVD-ROM Drive? No Problem!

Are you worried that your next PC or laptop might not have an optical drive? How would you cope? **Roland Waddilove** has the answers



The CD/DVD-ROM drive was once an essential component in desktop and laptop computers, almost as important as the hard disk or graphics card. Its time is rapidly coming to a close, though, as it slowly heads the way of the floppy disk drive. It is dying out; ultra-light laptops do not have them, and even some ordinary laptops with fewer space limitations are not including them as standard. So the question for many is 'can I manage without one?'

A quick look around a couple of high street PC stores recently was enlightening; of the 25 laptops we saw on display, more than half did not have optical drives. It is therefore becoming likely that your next computer won't have one.

Software is mostly downloaded from the internet these days; it is quick and convenient, fast internet connections are common, and so the vast majority of applications download in seconds (a couple of minutes, at most). The problem is that you might have old software on CDs or DVDs that you need to install or reinstall occasionally. If there isn't an optical, how do you install it? You can buy or rent movies online from the Google Play Store, Apple

iTunes Store and other places, or there are streaming services like Netflix and Amazon Prime with have thousands of movies and TV episodes to watch, but many people have built up a library of DVDs; so how would you play them? There are over one hundred Linux distros that could be worth a try, and an ISO file (.iso) can be downloaded, burnt to a DVD-R and used boot up with it. You might just want to run this so-called 'Live disc' without actually installing the distro at all, or you may want to set it up in a partition on the disk drive, or install it into VirtualBox and run it as a virtual machine – but how do you do this if there isn't an optical drive?

Windows 7 was distributed on DVD. If you want to set it up in VirtualBox, perhaps to run old software that doesn't work in Windows 10, it is going to be a problem if your computer does

“ So now you have a reason to keep that old PC running Windows XP, simply set up the share and connect to it ”

not have an optical drive – so should you limit your options when buying a new computer and only get one that has an optical drive? One thing is pretty certain: at some point in the not-so-distant future, optical drives will completely disappear from all computers and we need to learn new ways.

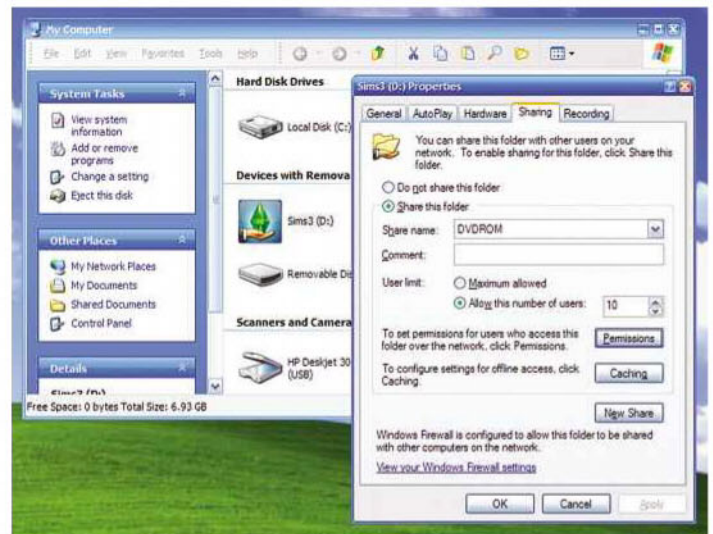
Hardware Options

Almost everything is digital and online these days, but having occasional access to an optical drive is important, although you don't need to have one in your PC all the time. So, while your next computer might not have a CD/DVD-ROM drive, you may have older machines around your the home or office that have a drive you can use occasionally. As long as one of your computers has an optical drive, it can be used on those rare occasions when you need one.

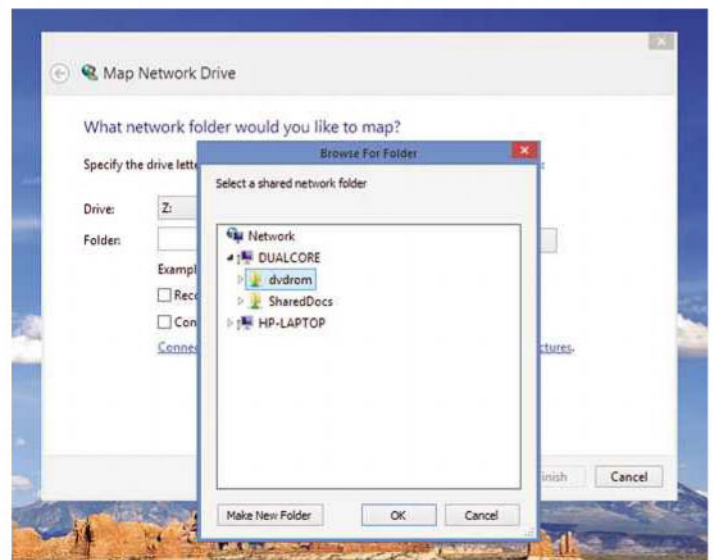
This means it may be a good idea to keep an old computer just for those occasions. A laptop is the most convenient option, as it can be put away in a cupboard or drawer when it is not being used. So don't dump your old PC or laptop at the local recycling point, hang on to it, it might be useful. An old computer with a CD/DVD-ROM drive can even be shared over the wi-fi network and accessed from your new drive-less computer. So now you have a reason to keep that old PC running Windows XP, simply set up the share and connect to it.

Getting a Windows 8 PC to talk to a PC running an old version of Windows is harder than it should be, but it can be done. On the old PC with the CD/DVD drive, go to Control Panel > Folder Options, select the View tab and clear the tick against 'Use simple file sharing'. Click Start and select Computer or My Computer, right click the optical drive (usually D:) and select Sharing and Security. Select the option to share the folder and enter a share name like DVDROM. Select 'Allow this number of users' and set it to 10. Click Permissions and make sure that the Everyone group has all the items ticked in the Allow column.

On the new computer without a CD/DVD, open an Explorer window and select Computer or This PC, go to the Computer tab in the ribbon at the top and click 'Map network drive'. Use the



▲ Share the CD/DVD-Rom drive over the network on one computer...



▲ ...and access it on another computer by adding it as a network drive

Browse button to find and select the shared CD/DVD drive on the other computer. It then appears Explorer and when there is a disc in the drive, it can be used to run software, browse, pull files off, play movies and so on like it was an internal CD/DVD-ROM.

USB Drives

Provided you have one computer with an optical drive, you can share it and access it on every other computer, but what if you only have one computer and it does not have a CD/DVD-ROM drive? Most of the time it is not needed and you can use the web to listen to music, watch movies, download software and so on. On those occasions that you need one, the best option is to buy an external USB CD/DVD-writer. The advantage of this is that it is easily shared among several computers because it is so light, portable, and is plug-and-play.

USB optical drives are quite cheap and prices start at around £20 for budget models with basic features. This means that buying a desktop PC or laptop that does not have an internal optical drive is not the end of the world. If you find that you cannot live without one, just buy a cheap USB 2 model and plug it in. Many are so low powered that they can work off the limited current provided by the USB port and they do not need a separate external power supply.



▲ Samsung has some very cheap external portable CD/DVD drives

▶ Use software like CDBurnerXP to copy your CDs and DVDs on an old PC



The Samsung SE-208GB and the LiteOn EBAU108 are two examples at the budget end of the market and they are around £20 give or take a couple pounds depending on the supplier. The ASUS SDRW 08D3S-U and the LG GP57EB40 are also cheap external USB CD/DVD-writers costing just over £20. There are many more USB optical drives and if you pay a bit more you can have a unit that takes advantage of the higher data transfer speed of a USB 3 port, or has Blu-ray reading and writing capabilities. Top of the range models at around £50 to £60 can read and write pretty much any type of disc you can insert.

Create Disc Images

One of the ways in which you can manage without an optical drive is by copying any discs to the computer's hard disk. Using an old computer or an external USB optical drive, you can copy music CDs, software CDs, clipart CDs, movie DVDs and so on, saving them to the PC's disk as ISO files. These can be accessed like they were discs in an optical drive.

There are several free utilities that can copy a CD or DVD and save to disk as a ISO file, such as the ever popular CDBurnerXP (cdburnerxp.se). Run the program and select Copy or grab a disc. Select the hard disk drive as the target and the file type to ISO (Single track). Click Copy disk and in a few minutes time you will have a ISO file of the CD or DVD. If you are using an old PC to create ISO files you will then need to transfer them to the PC or laptop without an optical drive. Shared folders on Windows can be accessed from other computers over the network, so you could put them in there, or you could use a USB flash memory drive to copy the file.

Most CD/DVD burning software can create ISO files and free ones are fine. Alternatives to CDBurnerXP include Burnaware (burnaware.com), ISO Workshop (glorylogic.com), and Ashampoo Burning Studio Free (ashampoo.com). These tools can be used to turn any CD or DVD into a ISO file saved to the disk drive and this includes DVD movies, provided they are not copy protected in any way. There are utilities that can copy protected DVDs and save them to disk too, but if you want to go down that route, then you will have to find those tools yourself.

Windows Media Player, iTunes, CDex and other utilities are able to copy your music CDs and save them to disk as WAV files if you have the disk space, or MP3s if you don't mind a little compression in return for big disk space savings.

Most software, movies, music, photos and clipart, and other

“ Recent versions of Windows have included support for ISO disc images, so ‘mounting’ one is just a matter of double clicking it ”

content is available online, and those few old old CDs and DVDs you need can be copied to disk. Windows DVDs, such as XP, Vista and 7 can be copied to the hard disk drive, and from Windows 8 onwards you can download ISO images. All Linux distros are available as downloadable ISO images and it is the standard method of distribution.

Use CD/DVD Disc Images

Now that you have ISO images of any CDs and DVDs you need, or have downloaded Linux, Windows or whatever software you require, you can use them on your optical drive-less computer. Disc images can be used to create virtual CD/DVD-ROM drives and Windows can access the contents just as if it was a real optical drive.

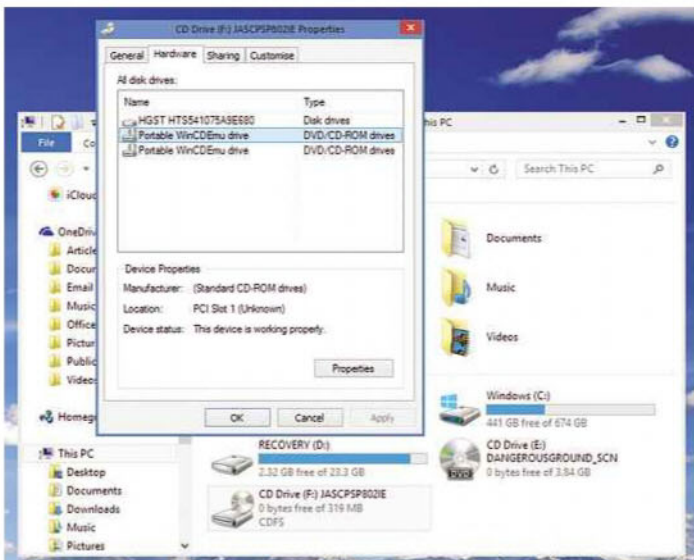
Recent versions of Windows have included support for ISO disc images, so ‘mounting’ one (the virtual equivalent of putting a disc in a drive) is just a matter of double clicking it. If you have copied a DVD movie disc and saved it as a ISO file to the hard disk drive, double click it. It will then appear as a drive in Explorer windows and can be accessed using any software. For example, run VLC media player (videolan.org), go to the File menu, select Open folder, and then select the virtual drive. VLC will play the movie like it was a real DVD in an optical drive.

If you have a clipart CD with images you want to browse, double click the ISO file to mount it and it appears as a drive in Explorer and the contents can be accessed. Subsequently, when you have finished with an ISO image and want to remove it from Explorer, go to Computer (or This PC), right click the virtual drive and eject it.

You can do a lot with basic Windows ISO handling, but you can go a step further and install a CD/DVD-ROM drive emulator. This is a utility that adds a virtual optical drive that looks to the system like a real one. It provides more features and better ISO image handling than Windows.



▲ VLC and other DVD players can play movies from ISO files in virtual drives



▲ WinCDEmu enables you to mount unlimited disc images in CD/DVD-ROM drives

WinCDEmu (wincdemu.sysprogs.org) is an open source CD emulator that can be used to mount ISO disc images, and also CUE, NRG, NRG, MDS/MDF, CCD, and IMG images. It runs on all versions of Windows from XP upwards and it can create any number of virtual CD/DVD-ROM drives.

There is very little to the program apart from being able to mount a disc image and unmount it. It just works, basically. However, it is also worth noting that there is a portable version of the application that does not require installation. It is especially useful for older versions of Windows that don't have support for ISO images.

DVDFab (dvdFab.cn/virtual-drive.htm) is similar and it enables up to 18 virtual CD/DVD/Blu-ray drives to be added. It can automatically start with Windows and automatically mount disc images. This means that you can switch on your PC and have half a dozen CDs and DVDs in virtual drives ready to use.

Other optical drive emulators include Virtual CloneDrive (slysoft.com/en/virtual-clonedrive.html) and the commercial

offering Alcohol 120% (alcohol-soft.com), which enables you to make backups of CDs and DVDs to disk images for playing on your computer.

Try Linux

Lots of people like to experiment with Linux and try out the various versions and the features they offer. The usual way is to download a ISO disc image, burn it to a disc and then boot the computer with it in the drive (a so called 'Live disc') before deciding if they want to go on to a full install. However, If you do not have an optical drive then this is obviously not possible.

One solution is to use VirtualBox (virtualbox.org) and this creates a virtual computer complete with CPU, RAM, disk, CD/DVD-ROM drive and so on. It does not matter whether your computer has a real optical drive or not, VirtualBox provides a virtual one for the virtual computer.

In VirtualBox, click the New button in the toolbar to create a new virtual machine and when it has finished, click the Settings button. Select Storage on the left and below Controller: IDE is an empty CD-ROM drive. Select it, click the disc button on the far right of CD/DVD Drive and you can choose a Linux ISO file. When the virtual machine is started, it will boot from the Linux ISO file and you can run it or install it as normal.

Windows can also be installed into a virtual machine in the same way. Download an ISO image of Windows or create one from the disc on another computer and then set it as the CD in the storage settings.

If you would rather boot your computer from a Linux disc rather than a virtual machine, go and get a free copy of Universal USB Installer (bit.ly/1HUI9Aa). This enables you to convert a Linux ISO file, such as Ubuntu for example, to a bootable USB flash memory drive. You will need one large enough to store the ISO file. Most are under 4GB, although a few are larger than that. Plug in the USB flash drive, run the USB Universal Installer, select the Linux distro and let it do its magic. Afterwards you can boot your PC from the USB flash drive like it was a CD/DVD.

Many Linux distros work as a Live version without installing, as we mentioned earlier, so this is a handy way to test them on your computer without erasing Windows. The USB flash drive can be formatted and a different Linux added when you want to try a new one. Or you can even use it on a variety of machines if you move around a lot. mm



▲ No optical drive? Save Linux to a USB flash drive and boot it from that

Underrated Features of Windows



We look at a handful of overlooked Microsoft elements



▲ Kittens are the only Windows Theme that can calm the editor down

Windows gets a fair amount of stick from most people, regardless of whether they're in the computing industry or not. Windows 8.1 in particular is a favourite target for anyone who fancies a rant against the Redmond company, but it's not the first version of the operating system that has attracted criticism.

I can recall one particular person who complained daily about how much he hated Windows XP, then when he started using Windows 7, he suddenly found love for XP and focused his attention on the failings of Windows 7. Likewise, the cycle of rant and former love continued with Windows 7 and Windows 8.1. It's quite amusing now I look back at it.

However, for all the hate the OS receives, it's actually very good. I'll even go out on a limb and say I like Windows 8/8.1 and I have since I first got hold of an early copy for review. Windows has within it many features that we take for granted. True most, if not all, of these features are available for Mac and/or Linux too, but it's Windows that has brought them into the majority of users' homes and that most folks can identify with.

Anyway, let's have look at some of the more underrated features of Windows, regardless of the current OS version.

Speech Recognition

Windows Speech Recognition has been built into every versions of Windows since the Vista days and available before that as a third-party feature for the likes of Office or as a part of the Plus! packs.

The Speech Recognition feature itself allows users to control their computers using voice commands alone. It can start programs, open menus, click buttons and other objects, and it can dictate text into documents as well dictate and write emails. Basically, pretty much everything you can accomplish with a mouse and keyboard can be done with your voice.

It takes a bit of setting up, and the program needs to learn, improving its ability to recognise your speech patterns.

While it may not be quite as powerful as some of the more dedicated third-party products available, Windows Speech Recognition is surprisingly good, and it's free too.

Omni Search

While most of us use the Windows Search function to locate a stray file or folder, there's another part to the newer Windows 8.1 search called Omni Search.

UNDERRATED FEATURES OF WINDOWS

If you start typing while on the Start screen and you're connected to the internet, then the search will include found objects on your system, network, shares and the entire internet.

For example, typing in Casablanca will bring up the Humphrey Bogart movie, a Microsoft map of the Moroccan port city, any related books, videos, Wikipedia entries and just about everything else you can think of.

There are theories that the searches are somehow logged by Microsoft or the CIA, but to be honest I'm not really sure. Just in case, though, make sure you're going to be searching for something worthwhile for the poor secret government officials to look at.

Sticky Notes

They may seem like a small entry, but Sticky Notes in Windows 7 has been a godsend to many a user.

Rather than cluttering up your nice new, bezel-less LCD monitor with yellow Post-It notes detailing an abundance of irrelevant facts (mostly passwords, it seems), Windows Sticky Notes offers you a digital alternative.

You can format the text within the note, change the colours, resize them, collapse the and flip through multiple notes with relative ease, and they never lose their stickiness and fall behind your monitor into that dusty pit that's only ever discovered when you get a new PC.

The Calculator

This might seem like an odd entry, but the old Windows 7 Calculator is a far more powerful program than most people give it credit for.

You choose the type of calculator from Standard, Scientific, Programmer and Statistics. And it can convert various units, such as angles to and from degrees; area into acres, hectares and so on; Length; Power; Pressure; Temperature; Time; Velocity; Volume and Mass/Weight. It's really quite an impressive and much underrated application.

Remarkably, there's also the ability to calculate the difference between two dates and have the sum appear in years, months, weeks and days. Finally, if that wasn't enough, the Windows 7 Calculator contains some worksheets that help you calculate your monthly mortgage payment, vehicle lease and fuel economy for miles per gallon.

Clearly there's more to good old Calc than what first meets the eye.

Ctrl+Alt+Del

The Ctrl, Alt and Del keys have been a part of Windows for as long as I can recall. Previous to the Windows 3.1 days, in very early DOS days, the three keys were used to reboot the PC. After Windows 3.1, they invoked the dormant god of Windows, the Task Manager.

How many times has Ctrl+Alt+Del saved you from having to wait for a broken program to finally close or allowed you to log into a networked PC or Windows NT PC? It even works within the BIOS.

Even on systems where the combination of three keys do something else, should a program misbehave, most users will automatically head for the Ctrl+Alt+Del keys instinctively.

Windows Themes

Windows Themes may not seem like much of an underrated feature, but when you stop to consider how easy it is to find, download, install and even create your own, you begin to realise just how comfortable the process is.

There was clearly a lot of work involved in getting Windows as personalised as possible. You may not be able to fiddle with its inner workings too much or not in the same sense as you can with Linux, for example, but you can put your stamp on the desktop wallpaper, colours, sounds and icons.



▲ The Windows 8.1 Omni Search is actually very good



▲ The humble Windows calculator has more going for it than you first think

Whether you're into horses, cats, icebergs, polar bears, wolves or Angry Birds, there's a theme on the official Windows site for you. If you delve a little deeper into the internet, you'll no doubt come across many more themes relating to nigh-on every subject matter you can possibly think of.

It's surprising how little regard is offered to Windows Themes. Imagine if it was suddenly removed and you were left with just a boring old wallpaper. How else would our editor have a slideshow of cute kittens on his desktop?

Conclusion

These are but a handful of the underrated features of Windows that I can think of. Needless to say, there are probably countless more; indeed, I've likely used several just in this article alone that I haven't mentioned.

If you have some you'd like to mention, then please feel free to let us know. [mm](#)

Other Underrated Windows Features

Here are a few more underrated features that sadly never made it into the main body of the article:

- **Task Manager:** where would be without it?
- **Split screen apps in Windows 8.1:** It's amazing it took this long.
- **Snap edges from Windows 7 onward:** Again, why did it take so long to appear?
- **Netflix and Windows Media Center:** I haven't tried this, but apparently you can get Netflix by default in Windows 7 Media Center.

ViewSonic VX2475SMHL-4K

ViewSonic takes aim to make 4K the desktop display a standard

DETAILS

- Price: £329 SRP
- Manufacturer: Viewsonic
- Website: goo.gl/dX8mEC
- Requirements: Device with HDMI or DisplayPort output, ideally 4K resolution



The first wave of 4K monitor designs didn't exactly overwhelm me, because they either didn't do more than 30Hz or they cost a fortune.

ViewSonic's VX2475SMHL-4K is a strong indication that the 4K market and products are maturing, for those that want 3840 x 2160 and resolution and 60Hz displays.

The big change here is that instead of using TN technology, this panel uses an IPS design that ViewSonic calls SuperClear PLS.

This technology promises true 8-bit colour rendition, a decent response time, very high dynamic contrast and excellent 178 degree viewing angles.

That combination provides this monitor with a potentially wide appeal, as it will work

well for both business users and casual gamers, if their PC is capable of driving it at full resolution.

By default, the VX2475SMHL-4K supports HDMI 2.0 and DisplayPort 1.2a, and you'll need one of those technologies in your PC to get the full resolution available.

Once you've got it running, you'll need to do some modest calibration work and also tweak Windows to scale the interface.

I wish this scaling aspect worked all the time, but it

doesn't. While reviewing the VX2475SMHL-4K, I was also testing the RTM version of Windows 10, and a new AMD Catalyst control panel installed and it was microscopic on this display.

When you need a magnifying glass to read the messages, you know there isn't the synergy that you were hoping for between the software and hardware makers.

The other problem I had with this design is that normally displays that cost this much have an adjustable telescopic stand, but this just has a foot. It does have a VESA mount, but for this money I'd expect better.

If the ViewSonic VX2475SMHL-4K comes with a major caveat, it's the size, which at 24 inches would be fine working scale for 1080p. At 4K it seems very small, and you'll need to use scaling to use the Windows desktop interface.

And if you wish to actually see pixels, you probably have

to be only 18 inches away from it, I estimate. That's not a very natural distance, unless you're very myopic.

That put me in a quandary, because I like what the VX2475SMHL-4K does, though I'm not actually convinced that it's practical for many normal applications.

Perhaps I'm over-analysing this. If you want an affordable 4K panel on your PC, then this is a good one, regardless of whether you can actually use that resolution or not.

For photographers, the resolution and colour presentation is critical, but sadly ViewSonic for whatever reason doesn't support AdobeRGB on this panel.

That leaves the VX2475SMHL-4K as a display that gamers who want 4K on the cheap might like, and perhaps someone with limited space and access to 4K movie streams.

As lovely a display as it is, 24 inches just doesn't seem big enough for this resolution, unfortunately.

mm Mark Pickavance

A 4K monitor for gamers and designers alike

Specifications

- Resolution: 3840 x 2160
- Screen size: 24 inches, 23.6" viewable diagonally
- Contrast ratio: 1000:1
- Colours: 16.7 million colours (8-bit)
- Brightness: 300 cd/m2
- Refresh Rate: 60Hz
- Screen Lighting: LED
- Response time: 2 ms grey-to-grey
- Viewing Angles: 178 degrees horizontal and vertical
- Connectivity Ports: 1 HDMI 2.0, 1 DisplayPort 1.2, MHL 2.0, 1 HDMI 1.4, headphone jack
- Power: 35W (typ.) / 50W (max.)
- Weight: 4.6kg with stand, 3.7kg without stand





Roccat Nyth

The ultimate gaming mouse?

DETAILS

- Price: ~£90
- Manufacturer: Roccat
- Website: goo.gl/N5oyat
- Requirements: Windows 7 or later, USB port, online drivers, 3D printer for optional custom button prints



Who would have thought the humble mouse would evolve into such a complex piece of mechanics and design? We've seen some of the finest examples of high-end mice over the last few years; examples from Razer and Madcatz spring to mind, with an extraordinary array of buttons and abilities. However, they all pale in comparison when lined up next to Roccat's newest product.

The Roccat Nyth is more than just your average gaming mouse. True, the packaging clearly states it as an MMO gaming mouse, but the Nyth has a few other strings to its bow.

To begin with, the Nyth is a large, impressively designed mouse. The main left and right buttons are formed from a single, rubber-feel plastic that extends over the palm rest and the sides – in the same vein as the Roccat Tyon. There's a large scrollwheel and, sat slightly further back, a tilt left/right button.

In terms of the optical technology involved, the Nyth has a 12,000dpi Twin-Tech Laser Sensor, adjustable in 1dpi increments. A 1000Hz polling rate, 1ms response time and 50G acceleration are similarly impressive features, and to add to that list you'll also get an adjustable lift-off distance, a

tracking and distance control unit, and within the mouse itself there's a 72MHz 32-bit ARM processor and 576KB of on-board memory.

The right-hand side of the Nyth can be removed and fitted with a wider grip/finger rest or a slimmer and more streamlined section. Both sections are provided and pop in and out of their allotted place by a set of four magnets.

Furthermore, the opposite side of the mouse houses a modular and mechanical 12-button array. Each button can be removed by sliding the release switch located at the bottom of the mouse and replaced with a provided set of alternative button arrangements. You can opt for 12 individual buttons or a set of six larger button or three long strips.

We've seen multi-button, side-mounted setups in the

past, but none that can be removed and swapped for different configurations before. In addition to being able to swap out the side-mounted buttons, you can actually 3D print any number of custom buttons you see fit to attach to the side of the mouse.

Finally, if that lot wasn't already enough, when combined with the software, the configurations of the buttons plus the customised elements of the 12-side modular button system allow you set up a possible one sextillion (10^{24}) function combinations. Ludicrously, that's more than the number of atoms that make up the actual mouse.

The presentation of the mouse is immaculate. Everything from the packaging, to the accompanying documentation and the included side button

carry case is superbly turned out. And there's more information via the Roccat Nyth site including a link to the 3D library store for downloading further button designs to be printed out.

The Nyth is a fantastic mouse to use, it's smooth, perfectly weighted and feels great. The added benefits of innumerable customisations and the potential for a truly personal setup go without saying, despite the fact that most users will barely even scratch the surface of what this mouse is capable of.

£90 may sound like a heck of a lot for a mouse, but considering what you're getting here and what the Roccat Nyth is capable of, you can understand the expense. If it's hard-core gaming you're into, then we think the Roccat Nyth will be a perfect addition to your setup.

mm David Hayward

Quite simply, the most impressive gaming mouse we've ever seen



Intel SSD 750 Series 1.2TB

With great power comes inevitable cost, but also stunning performance

DETAILS

- Price: £820.94 (Scan)
- Manufacturer: Intel
- Website: goo.gl/hZ80i7
- Requirements: PC with PCIe 3.0 x4 slot

I've reviewed lots of SSDs over the past couple of years, and it's become increasingly difficult to separate them performance-wise. That's because at about 530MB/s transfer speed, SATA-3 reaches saturation point, and regardless of how fast the NAND modules are, it just won't go any quicker in the PC.

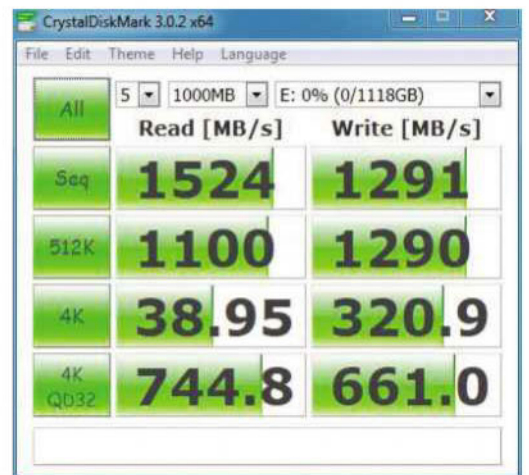
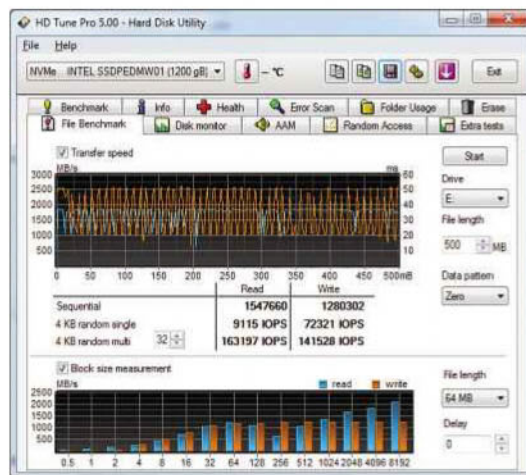
What's required is a new SATA, coming in the form of SATA Express 3.2, but that's not generally around yet, so in the meantime there's good old PCI Express.

Intel was one of the first companies to explore SSD technology, so it's not much of a surprise when it delivered the 750 Series, built around PCIe.

Technically, there are four 750 Series model, two of which look like 2.5" drives, although they connect to SFF8643 PCIe connector and not SATA.

The other two are half height cards designed to occupy a PCIe 3.0 slot on a PC motherboard, and it was the larger of those that Intel sent me for my appraisal.

Under a big silver heatsink is 1.2TB of Intel's own 20nm NAND flash memory Multi-Level



Cell (MLC). It needs that heat dissipation apparatus, because under write operations it can consume as much as 22 watts.

That's something of a contrast to what I normally associate with SSD technology, but then the 750 series does significantly more than almost any other.

Rather than the memory being the special sauce in this product, it's how Intel has coupled this to the PCIe bus that's clever.

Non-Volatile Memory Host Controller Interface Specification (NVMe) – or NVMe Express, as most sane people are calling it – is the interface that bridges between the NAND controller and the PCIe bus. What this does is mostly address the issues that Advanced Host Controller Interface (AHCI) interface has with SSD technology, in that it isn't geared to the low

latency of flash memory or the potential for simultaneous operations.

Where AHCI has a single command queue and only 32 commands in that queue, NVMe Express has 64K queues and 64K commands possible in each of those. This and other efficiency improvement together with the larger bandwidth of the PCIe bus allows the limiting factor to become the NAND modules again, and not how the PC is accessing them.

The results, when compared with SATA SSD, are quite

Key Features

- PCIe Gen3 x4 with NVMe interface.
- Consistently high IOPS and throughput.
- Sustained low latency.
- Enhanced power-loss data protection.

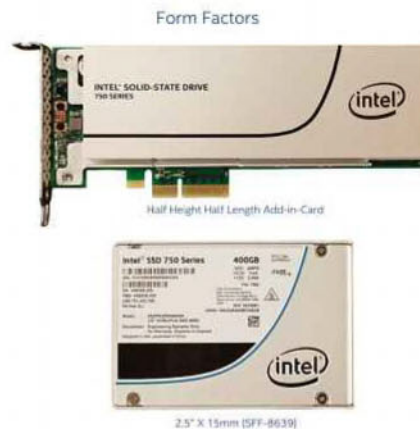


Intel® SSD 750 Series Specification

| Performance ¹ | Unit | 400GB | 1.2TB |
|--------------------------|------|---------|---------|
| Random 4KB Read (up to) | IOPS | 430,000 | 440,000 |
| Random 4KB Write (up to) | IOPS | 230,000 | 290,000 |
| Sequential 128KB Read | MB/s | 2,200 | 2,400 |
| Sequential 128KB Write | MB/s | 900 | 1,200 |

| Latency | Sequential | Random |
|--------------------|-------------|--------------|
| Read ¹ | 20 µs (TYP) | 120 µs (TYP) |
| Write ¹ | 20 µs (TYP) | 30 µs (TYP) |

| Power | Unit | 400GB | 1.2TB |
|------------------------|------|-------|-------|
| Active Write - Average | W | 12 | 22 |
| Active Read - Average | W | 9 | 10 |
| Idle | W | 4 | 4 |



¹Tests document performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase. Performance measured by Intel using formlines 1.1.0 with queue depth 32. Measurements are performed on 8 GB of Logical Block Address (LBA) range on a full SSD. System configuration: Intel® Core i7-5960X processor, Intel® X99 chipset, 32GB DDR4 2160, Windows 8.1.

a MTBF (mean time between failures) of 1.2 million hours or 136 years, and lifetime endurance of 70GB writes per day or a total of 127TB written over the five-year warranty period.

For good measure, Intel also threw in a mechanism to avoid corruption in the event of power loss, should you not have invested in a UPS.

The catch, if you hadn't guess already, is the price. At more than £800, it costs at least double what a SATA 1TB SSD might. But it outperforms in most respects those devices by triple the speed, and the power consumption to performance ratio is also terrific.

Intel also makes a 400GB version if your problem will fit into that space, though at around £300, it doesn't represent the same value per GB as the 1.2TB model.

If your database needs a kick in the pants or your CAD modelling is holding back your project, then Intel has your back, should you be happy to splash this kind of cash.

mm Mark Pickavance

staggering for anyone who started with 5MB hard drives. According to Intel, this unit is rated to 2400MB/s reads and 1200MB/s writes, knocking all SATA-based NAND products firmly into the also-ran category.

My testing didn't elicit quite those numbers, but with 1524MB/s reads and 1291MB/s writes, this is the fastest drive I've ever tested by some considerable margin.

But speed on an SSD is only part of the story, because

what really segments the better units from those less capable is IOPS, and those numbers are even more impressive here. The 1.2TB model is specified at 440,000 IOPS read and 290,000 write on random 4KB operations, blowing every SATA SSD out of the water. A good SATA drive can do 100,000 read IOPS, on a good day.

At this level, the 750 series is elevated from a luxury to a very specific tool designed to deliver amazing performance

for time-critical operations. A PC with this in won't just boot fast; it will do anything involving disk operations quickly, specifically something complicated. The target audience here are those with a big database they need to process, 4K video editing and other computer heavy lifting like fluid dynamics calculations.

And to make sure those deadlines are hit, Intel also designed the 750 Series with

The future performance of SSD technology, but now



BenQ XL2720Z

When it comes to monitors, gamers are among the more demanding users

DETAILS

- Price: £338.00 (Amazon.co.uk)
- Manufacturer: BenQ
- Requirements: n.a.

The BenQ XL2720Z is a 27" monitor aimed at hardcore gamers looking to enhance their performance.

The monitor is capable of displaying 16.7 million colours at a resolution of 1920 x 1080 with a pixel pitch of 0.311mm. With back light capability and 598 x 336mm display area, the monitor delivers a viewing angle of 170 / 160 degrees. Mounted on the rear are connections for mains power, D-sub, DVI, dpi.2 and USB options, while there are also two side-mounted HDMI ports plus a headphone socket. Touch-sensitive buttons running down the lower right of the monitor's frame provide access to such features as blur reduction, picture mode,



display mode and OSD menu.

Included in the box with the monitor is a two-piece stand with height adjustment capability. You also get various leads for power, D-sub, DVI-D dual link and USB. There's also an S-Switch device, which is a wedged-shape unit that acts as a remote control to quickly change the settings for different display settings.

The S Switch connects to a mini-USB port on the rear of the monitor via a 78cm lead, which should allow you

to position the device near to hand for when needed. The S Switch can to change between settings for various environments. As well as a scrollwheel, the S Switch has four buttons, allowing you to select an appropriate mode or return to a previous setting. Depending on a short or long press, these buttons will react in different ways.

BenQ has built into this monitor a number of features and enhancements that should appeal to those belonging to the hard-core gaming fraternity and may well appeal to users who are more business orientated. Standard screens have a tendency to flicker, which you might not notice, but it could cause eye fatigue and possibly headaches. BenQ claims that the XL2720Z has been developed to eliminate flicker at various brightness levels.

Another cause of eye fatigue and headaches is motion blur. This effect can happen, especially in fast moving action games, when degradation in image quality can occur due to delayed changes in the colour of pixels brought on by the

movement of graphical elements. While not claiming to have eliminated motion blur completely, BenQ has managed to reduce its effects.

One area that gamers are always demanding improvement in is monitor refresh rate. BenQ's answer is the development of GROM technology (Gaming Refresh-rate Optimisation Management). This feature can give gamers a 1ms GYG (Grey to Grey) response time with this monitor.

All in all, this combination of technologies makes for a monitor that's more than capable of keeping up with the demands of modern PC gaming.

mm Michael Fereday

A plain appearance that can deliver an environment for gaming

| BenQ XL2720Z Gaming Monitor | |
|-----------------------------|--|
| Screen size | 27" |
| Aspect ratio | 16:9 |
| Resolution | 1920 x 1080 |
| Pixel Pitch | 0.311 |
| Brightness | 300 cd / m2 |
| Native contrast | 1000 : 1 |
| Dynamic contrast ratio | 12m : 1 |
| Panel type | Twisted Nematic |
| Viewing angle | 170 / 160 |
| Response time | 1ms GTG |
| Display colours | 16.7 million |
| Colour gamut | 72% |
| Vertical refresh rate | 100 / 120 / 144Hz |
| Input connector | D-sub, DVI-DL, HDMI x 2, dpi.2, headphone jack |
| USB hub | Downstream x 3 |



HP OfficeJet 3830 All-in-One Printer

Mark looks at the affordable end of HP's OfficeJet spectrum

DETAILS

- Price: £51.23 (Ebuyer)
- Manufacturer: HP
- Website: store.hp.com/UKStore
- Requirements: Windows 7 or later, OS X Mountain Lion/ or later. Android and iOS through cloud printing. USB port or wi-fi connection, CD-ROM/ DVD drive or internet connection



I've covered a number of multi-function printers recently that defied my expectations, but the HP OfficeJet 3830 turns out to be a more traditional device.

It's a typical personal printer/scanner/copier/fax, and at just a little over £50 it's within most budgets.

Along with that low cost, on the plus side of the equation I'd also note that this isn't a huge desk-space-sucking box. It measures just 450 x 364 x 224.4mm, and even with its output tray extended, this isn't an awkward peripheral to place.

Print quality is also respectable, delivering 1200dpi mono output and 2800 x 1200dpi colour, using HP's latest thermal inkjet technology.

HP quotes 8.5 ppm black and 6ppm colour, though that assumes 5% limited coverage. With a duty cycle of 1,000 pages a month, the OfficeJet 3830 isn't meant to print large volumes, and in that respect the print speed probably isn't critical.

What makes me think that this design is more focused on the home user, and not offices, is that HP gave it a borderless printing capability and a wide range of media types that even includes iron-on transfers.

“ Using HP Instant Ink, the running costs can be reduced by up to 70% ”

There isn't a wired networking option, but the wireless one does both direct and access point connected printing, and it's also Apple Airprint compliant. And by definition, once connected to the internet, you can cloud print from tablets and phones.

Within the limited budget, HP also allowed a tiny 5.5cm touch display for selecting copying and other functions, like scanning to an inserted USB key.

That's a fine collection of features, and it mostly works

as advertised, but in saying that you also need to accept some limitations of this design. One of these is having only a single paper source, and it takes just 60 pages of paper and 20 sheets of card. But that's oversized for the output capacity of just 20 sheets, before they start falling on the floor.

The only duplex option is of the manual variety, though the scanner does have a 35-page sheet feeder fortunately.

But the bit that usually makes me foam at the mouth is that HP put all the coloured ink in a single tri-colour cartridge, which leads inevitably to ditching expensive ink unnecessarily.

However, this printer is one of the new designs from HP that users can use with their HP Instant Ink. This is a system where you pay a monthly fee, from £1.99, and your printer orders replacement carts when it needs them over the internet. That's an important option, because a standard black cart is £12, and a colour is £14, and the XL versions are both £23 from HP or in a dual pack for roughly £40.

The high-yield versions are only rated to 480 and 330 pages respectively, so on a per page basis it's about 4p a page for mono and 6p a page for colour. Using HP Instant Ink, those running costs can be reduced by up to 70%, depending how heavily you use the printer.

That option makes the HP OfficeJet 3830 more affordable to run than it otherwise would be, and it's worth considering for those who regularly print.

mm Mark Pickavance

A cheap multi-function printer now with HP Instant Ink



Archos Virtual Reality Glasses

Why bother with real reality, when you can have virtual reality?

DETAILS

- Price: £19.99
- Manufacturer: Archos
- Website: goo.gl/NUwqAs
- Requirements: Android, iOS, Windows Phone, 5" optimum, 4.7 to 6" compatible, decent powered phone CPU/GPU for VR apps



VR is back with a vengeance. Its failed start in the 90s was just a minor blip compared to how well it's being received these days. The likes of the Oculus Rift, the Steam VR headset and Project Morpheus from Sony are prime examples that this once considered dead technology is worth investing lots of folding stuff into.

Currently there are two main VR types available (three if you want to count Hololens): the type of headset that contains all the necessary processing for the immersive VR world, such as the Oculus Rift, and the type of headset that acts simply as a connected device for your phone, such as Google Cardboard and the model we're reviewing in this instance, the Archos VR Glasses.

The Archos Virtual Reality Glasses are an interesting concept. All you need to do is spread the hinged front of the headset to fit the dimensions of your phone, then gently close the four connecting sections around the phone, with the screen facing in, to block out any light from outside.

Once that's done, you place the headset on your head, adjusting the straps to comfortably fit the headset over your eyes and enjoy some of the beautifully rendered VR

apps available for the device you're using.

Naturally, there's a bit more to it, but essentially all you're doing is using the phone as the VR processor while the headset and internal lenses project the image straight to your eyes. It doesn't sound like much, but it works quite effectively.

The VR Glasses are made from a lightweight black plastic, which is a little cheap feeling but good enough for the task at hand. The front, with its four hinged sections that close around the phone, is reasonably well

designed and capable of fitting phones from 4.7 inches through the larger 6" models. We tested it with a Note 4 and its 5.7" screen worked a treat.

Archos states that a 5" model is the optimum sized phone and one with a screen resolution of 1080 x 1920, quad-core processor, accelerometer and gyroscope, since it's the phone that's doing the hard work here.

The side of the VR Glasses that will fit over your eyes is enclosed in a rubber seal, for both comfort and for blocking out the light. It too works well and is more

than comfortable enough for long use. Finally, the straps can be adjusted with a Velcro section that goes over the top of your head and an adjustment buckle that tightens the strap around the circumference of your head.

As we said, the Archos VR Glasses are comfortable enough and with the adjustable lenses inside the headset, you can tweak the view to your own personal tastes for better enjoyment and longer use.

There are a few niggles, one being the fact that you can't access any of the side buttons or touchscreen on the phone once it's mounted in the headset, and the other being the need to remove the headset for adjusting the lenses. However, both these problems are easily remedied with an external controller and a little patience. One of the main problems, though, is the lack of good VR demos and games for both Android and iOS.

The Archos VR Glasses only cost £20 and are an interesting stopgap for getting used to VR while you wait for the more powerful and non-phone headsets to arrive on the shelves. For the sake of a bit of fun, though, the VR Glasses are pretty good.

mm David Hayward

Good fun VR headset, cheap and easy to use



Speedlink Torid Wireless Gamepad

When is an Xbox controller more than just an Xbox controller?

DETAILS

- Price: £25
- Manufacturer: Speedlink
- Website: www.speedlink.com
- Requirements: PC or PS3 with spare USB port

Traditionally, the mouse and keyboard combo has been the main control system used for PC gaming, particularly for first-person shooters and strategy games. Today, it still enjoys that role, but it's also true that for a while various names in the gaming world have been pushing controllers too.

Steam, for example, has its Big Picture mode, which is designed to be navigated with a gamepad. And Microsoft, of course, endowed Windows with Xinput, making it possible to use an Xbox 360 controller with its PC operating system, and it's this controller that has become pretty much standard for PC gamers these days.

Thankfully, then, the Speedlink Torid supports Xinput, so if you have a game that supports Xbox gamepads, then this wireless one will work just fine. Plus it mimics the physical design of the Xbox pad well, meaning it's comfortable to hold, with the analogue sticks, d-pad and buttons all where you'd expect them to be. It doesn't feel exactly the same as the official Xbox controller, but in a blind test, we doubt most people could tell the difference.

However, the Torid, while functioning as a competent clone of an Xbox controller, is actually much more than that, and it packs a few extra features in. For a start, it doesn't only

support Xinput; it also works with DirectInput, which is handy for older games, as well as other titles that don't support Xinput. It also means it's compatible with the PlayStation 3, and the Speedlink button in the centre of the controller functions like the PS button on a PS3 controller. This button is also responsible for switching between the Xinput mode and the DirectInput, as well as acting as the Games For Windows menu button and the menu button for Steam's Big Picture mode.

As well as this useful versatility, the Torid also comes with a Turbo function, so you can temporarily set buttons to emulate rapid, repeated presses when pushed



mobile devices, but the nano-USB receiver that comes with the controller is small and discreet.

All in all, it's decent controller, and at around £21 from Amazon, it comes at a good price too. An official wireless Xbox controller would require you to also buy a USB receiver, and the combined cost of those would be around £40 at least.

Bearing that in mind, it's easy to recommend the Torid controller. It's affordable, looks good and its comfortable design is also commendable. If you looking to cut the cord when it comes to your PC gaming, the Speedlink Torid may well be just what you're looking for.

mm Anthony Enticknap

A versatile controller that can also be used with the PS3



GROUP TEST

Gaming Laptops

There was a time when gaming on a laptop was unheard of. These days, a gaming laptop is nothing unusual, and they can pack just as much performance as an entry-level gaming desktop.

David Hayward has been looking at six of them this week, to see which will keep up with your mobile gaming habits and which will lag behind.

Gaming Laptops

MSI GE60 2PE Apache Pro

DETAILS

- Price: £905
- Manufacturer: MSI
- Website: goo.gl/BF5x0x
- Requirements: Microsoft account for Windows 8.1 – Windows 10 upgrade possible

MSI has an impressive range of gaming laptops to its name. From the GS70 Stealth Pro edition through to the immensely impressive GX60 Destroyer, these laptops have led the way with blistering benchmark results and equally mouth-watering specifications.

The MSI GE60 2PE Apache Pro sits just below the Destroyer in the MSI gaming range, which gives it a fine tuned balance between raw computing power and price.

Its base specifications consist of a 4710HQ 2.5GHz (3.4GHz boost) fourth-generation Core i7, a 15.6" full HD anti-glare LCD, a 720p webcam, SD card reader, Blu-ray and DVD optical disc combo and 12GB of DDR3 RAM in a dual-channel setup.

You'll also find 802.11ac wi-fi, Bluetooth, HDMI with 2K/4K support, two USB 2.0 and two USB 3.0 ports, and a VGA port thrown in for good measure.

Helping to drive up the gaming benchmarks and the frame-rate is an Nvidia GTX 860M GPU with 2GB of GDDR5. This is an exceptional graphics processor, which is designed for extreme performance without heavy impact on the battery. Plus there's also an Intel HD4600 installed for more less demanding duties. And if that little lot wasn't enough to convert you, then perhaps the 128GB Hynix SSD and 1TB HGST Travelstar HDD will.

There's no doubt that this is a laptop brimming with gaming technologies, and with a 3DMark 11 score of 5740, it's not far off desktop results. The result, of course, is a laptop that's more than capable of playing the latest games at decent resolutions.

MSI have also paid a lot of attention to the exterior and presentation of the laptop. Even the packaging it arrives in, with its MSI dragon emblazoned box and soft cloth covering speaking of a higher



than usual level of quality. The laptop itself is very attractive; the black aluminium lid, complete with MSI Gaming Series badge and logo, opens up to reveal the excellent full HD screen and colourful backlit full-sized keyboard with numerical pad.

There's a good feel to the keyboard, with each key spaced adequately for larger fingers, and a nice tactile touch that allows your fingers to flow across without hindrance. The large touchpad is a little too sensitive by default, for our tastes, but it's a minor niggle on an otherwise excellently presented laptop.

At 2.6kg with the battery, the MSI GE60 2PE Apache Pro isn't the lightest laptop you'll ever carry around, but it's certainly more than sturdy enough to cope with the usual onslaught of gaming digits hammering down on the keyboard. The vents at the side can spit out a fair amount of heat during times of intense processing, though that's hardly surprising really considering what's going on inside.

Overall, it's a lean and stylish laptop with plenty of good hardware to keep even the most ardent of gamers happy for some time.



◀ The MSI GE60 2PE Apache Pro certainly is a colourful laptop

Alienware 13 Gaming Laptop

DETAILS

- Price: £950
- Manufacturer: Alienware/Dell
- Website: goo.gl/Zy7irP
- Requirements: Microsoft account for Windows 8.1 – Windows 10 compatible

Alienware, now belonging to Dell of course, has a rich history when it comes to creating gaming laptops. The Alienware 13 sits alongside the Alienware 15 and the Alienware 17, and as you might have guessed, the number denotes the size of the screen. In this case the 13" 1366 x 768 TN panel of the Alienware 13 makes this an incredibly small gaming laptop. However, it does pack quite a punch for such a small entry.

Inside you'll find a choice of processors, but the model we have on test is the entry level of the batch, with an Intel Core i5-5200U dual-core processor running at 2.7GHz. There's 8GB of DDR3L memory at 1600MHz and a 500GB 5400rpm hybrid hard drive with an 8GB SSD circuit to help cache the most accessed files.

In addition to the above, there's Bluetooth, Killer 1525 802.11ac wi-fi, three USB 3.0 ports, HDMI, mini DisplayPort, gigabit Ethernet and an Alienware Graphics Amplifier port. The Amplifier port is an external box, basically, in which there's a full-sized desktop GPU complete with its own PSU. It adds a graphical edge, but we didn't have one to test with, so we had to make do with the laptop itself, unfortunately.

Internal graphics come courtesy of an Nvidia GeForce



▲ *The Alienware 13 is a good-looking, smaller laptop*



▲ *But it lacks the necessary performance for good all-round gaming*

“ A decent enough laptop,

but as a gaming machine it

lacks the necessary punch ”

GTX 960M, with 2GB of GDDR5 memory. This resulted in a 3DMark 11 score of 3989, which isn't too bad considering the size of the laptop, but on the other hand it's hardly going to set the gaming world alight with blistering frame-rates.

In terms of the quality of the laptop, it's rather excellent. Alienware always prided itself, even before Dell took over, on designing the most aesthetically pleasing computers it could, and it certainly shows here. The angled chassis looks great,

complete with blue LED splashes on the lid and the glowing Alienware logo. The backlit keyboard is pretty decent to view as well, and it's surprisingly comfortable to use for a smaller laptop.

The screen, however, didn't quite match up to the rest of the specification. It was generally good, but in our eyes it seemed to lack clarity and sharpness. The colours too felt muted, and the viewing angles weren't too good either. We imagine that with the more expensive Alienware 13 models the screens are considerably better. For example, the £2,000 version of the Alienware 13 boasts a 1920 x 1080 FHD IPS panel, whereas the model we have costs £950 and lacks the luxury of IPS.

The Alienware 13 base model is a decent enough laptop, but as a gaming machine it lacks the necessary punch to offer higher frame-rates for modern games. It's expensive too, for what you get, and the screen isn't quite up to the same level of quality as the MSI model. If the price were dropped a few hundred, then it'll be worth considering. As it stands, though, you're best looking elsewhere for that amount.



Gaming Laptops

CyberPower Xplorer X6-7400

DETAILS

- Price: £625
- Manufacturer: CyberPower
- Website: goo.gl/nyW6by
- Requirements: Microsoft account for Windows 8.1 – Windows 10 compatible

Moving away from the more familiar brand names of Alienware and MSI, we have a system here from CyberPower.

The Xplorer X6-7400 is the entry-level gaming laptop from the impressive range that CyberPower offers, costing just £625 for the base system. However, that doesn't necessarily mean that it's lacking in terms of performance.

There's a 15.6" 1366 x 768 LED screen with an Intel i7-4710MQ processor running at 2.5GHz and 4GB of DDR3L 1600MHz memory. This base model comes with a 500GB 5400rpm hard drive, a DVD optical drive, 802.11 b/g/n wi-fi, Bluetooth, gigabit Ethernet, 9-in-1 card reader, VGA, a pair of USB 3.0 ports and a further single USB 2.0 port. HDMI and a copy of Windows 8.1 64-bit pre-installed finish off a reasonable list of specifications.

The GPU used here is an Nvidia GT 940M with 2GB of memory, which yielded a surprising 3DMark 11 score of 5210. On paper, the results of this laptop and the Alienware 13 one should have been reversed. It's quite odd, but it just goes to show you can't always judge a machine by its on-paper specifications, and



▲ *The CyberPower Xplorer X6-7400 may look pretty bland...*



▲ *But it has some gaming promise*

it's always worth giving the computer in question a quick test run before committing to buy, if possible obviously.

In terms of quality and design, the Xplorer X6-7400

isn't quite up to the same standards of the MSI or the Alienware. That said, it's perfectly functional, and when viewed and examined on its own, without it being

side by side with the previous two entries, it looks good. The brushed aluminium effect throughout is a good touch, although it feels a little too plastic in some areas. The keyboard is a full-sized affair, and even though it lacks a backlight, it's really quite good and feels natural, with adequate spacing between the keys.

The base model is an okay entry, but as with most other laptops on test, you can opt to include better hardware for a price. Realistically, the only major change you'd likely make would be for upgraded storage – an SSD or hybrid perhaps. Of course, the additional expense could add to the final benchmark scores and gaming ability of the X6-7400.

We thought the CyberPower Xplorer X6-7400 was a pretty good gaming laptop. It's not quite as powerful as the MSI model, but it's a good £300 cheaper. If it's a mobile gaming system on a budget you're after, then this could well be one of the best options to consider. And if you're willing to add an extra hundred pounds or so, the addition of an SSD and a processor upgrade could make a considerable difference.



Scan 3XS Graphite LG157

DETAILS

- Price: £880
- Manufacturer: Scan/3XS
- Website: goo.gl/xfc0WV
- Requirements: Microsoft account for Windows 8.1 – Windows 10 compatible



▲ Despite the LG157 needing a splash of colour, it's really quite impressive



▲ It's certainly a capable gaming laptop

Scan has taken the unique decision to shy away from the rather bland looking and uninspiring laptop designs that other suppliers tend to opt for. Instead of the common design, which is more or less what the CyberPower example looked like, Scan's 3XS Graphite range of laptops are sleek, smart and bristling with performance.

The 3XS Graphite LG157 is one of the mid-range models, costing around £880 for the basic, unaltered design. This particular laptop features a very good 15.6" 1920 x 1080 IPS panel, an Intel i7-4720HQ 2.6GHz quad-core processor, 8GB of Corsair 1600MHz memory, a 120GB M.2 SSD and a 1TB Hitachi Travelstar 5400rpm hard drive with Windows 8.1 64-bit pre-installed.

Other features include four USB 3.0 ports, VGA, HDMI and mini DisplayPort, S/PDIF output, gigabit Ethernet, 802.11ac wi-fi, Bluetooth and a 6-in-1 card reader, as well as a DVD optical drive.

The GPU is an Nvidia GeForce GTX 960M, with 2GB of GDDR5 memory, which when combined with the aforementioned processing power gives a 3DMark 11 score of 5750. That's ten more than the MSI Apache Pro, making it one of the highest scoring laptops in the group.

The design of the 3XS Graphite is quite lovely, for

“ The screen is the best part of the Graphite LG157. It's excellent ”

a laptop. The chassis has a matt-black finish throughout, including the inside of the laptop. There's a full-sized keyboard within, backlit and with good spacing and travel for each keypress. All in all, it's a very good design that feels considerably more expensive

than it actually is. We'd even go so far as to say it looks and feels better than the MSI and the Alienware models.

The screen, however, is the best part of the Graphite LG157. It's excellent, with bright, vibrant colours and superb clarity. For a mid-range

laptop, this is simply one of the best screens we've ever tested, especially the contrast and the black levels.

There could be a few improvements with the design, perhaps. A splash of colour on the chassis wouldn't go amiss, and it wouldn't distract from the overall feel of the laptop too. We're not saying it should become plastered with watercolours overnight, but taking a leaf from the MSI looks might greatly improve the aesthetics and lure in more buyers.

As with the Alienware and CyberPower models, you can further customise the setup of the LG157. A slightly faster hard drive or more RAM will up the cost, but in all honesty it won't do too much to the frame-rate in games.

Regardless of how the laptop looks, it performs very well indeed. And for £25 less than the MSI model, its nearest performance rival in terms of performance, it's certainly one worth considering.



Gaming Laptops

Chillblast Defiant 3 Mini 13

DETAILS

- Price: £900 from Chillblast or £809 via eBuyer
- Manufacturer: Chillblast
- Website: goo.gl/qKKCHy
- Requirements: Microsoft account for Windows 8.1 – Windows 10 compatible

To be honest, we didn't even realise Chillblast made gaming laptops, so we were quite surprised to have the Defiant 3 land in our laps.

As the name suggests, this is the third model in the series named after the famous, small *Star Trek* spaceship – described as a 'tough little ship'. The Defiant 3 is impressively specified despite its diminutive proportions, with a 1920 x 1080 13" matte IPS display, 2.5GHz Intel i7-4710HQ processor, 8GB of 1600MHz DDR3 memory, a 1TB Seagate SSHD and Windows 8.1 64-bit.

There's also gigabit Ethernet, 802.11 ac/b/g/n wi-fi, Bluetooth, three USB 3.0 ports, a single USB 2.0 port, HDMI, VGA and a multi-card reader.

The GPU used is the ever dependable Nvidia GeForce GTX 960M, with 2GB of GDDR memory. This all gives a benchmark score of 5710. It's a bit behind some of the others on test, but only just, and the fact remains that it's certainly a capable gaming laptop.

The design is okay too. We liked the sharp angles on the chassis, and the well-spaced, backlit keyboard feels good to the touch. However, it's a little bland looking, being varying shades of grey throughout,



▲ The Defiant 3 Mini 13 packs some power for its size



▲ There's plenty of gaming performance from this tough little laptop

with a large Chillblast badge stuck in one corner of the lid. It actually looks like one of the older HP laptops from years ago.

Putting the design aside for a moment, though, one of the best features of the Defiant

3 Mini is the glorious full HD, matte IPS screen. It's as good as the 3XS's display, with excellent colours, contrast and black levels, as well as a superb viewing angle and response times. And thanks to it being matte as opposed

to glossy, fingerprints are something you won't need to worry about.

Naturally all this exists in a 13" laptop, which is really quite remarkable. Our brief experience with a smaller gaming model, the Alienware 13, left us with a bit of a bad taste when it came to tiny laptops claiming to be gaming capable. Thankfully, the Chillblast Defiant 3 has restored our faith that a laptop of this size can still keep up with the bigger models when it comes to gaming.

The Chillblast Defiant 3 can be purchased direct from Chillblast for around £900, but we've seen some examples that drop down to as low as £809 (eBuyer with free delivery). It is customisable, in terms of a better processor, cooling, more memory and bigger storage, as well other options, but the base unit is quite a capable machine anyway.

We really liked the Chillblast Defiant 3 Mini 13. It's light, tiny and a decent enough mobile gaming platform, and if you take the price from eBuyer, then it's well worth looking into.



Lenovo Y70

DETAILS

- Price: £999
- Manufacturer: Lenovo
- Website: goo.gl/j8SE4q
- Requirements: Microsoft account for Windows 8.1 – Windows 10 compatible

Lenovo is usually restricted to the professional and enterprise business markets, but every so often the company tends to dip its metaphorical toes into consumer waters, with the Y70 being one such example.

The Lenovo Y70 is a large 17.3" gaming laptop with an impressive 1080p, ten-point multi-touch IPS screen. Inside you'll find an Intel i7-4710HQ quad-core processor running at 2.5GHz, a whopping 16GB of DDR3L memory and a 1TB SSHD with Windows 8.1 64-bit installed.

Furthermore there's gigabit Ethernet, Bluetooth, 802.11ac wi-fi, a pair of USB 3.0 ports and a single USB 2.0, HDMI, S/PDIF out and a 4-in-1 card reader. The GPU in this case is an Nvidia GeForce GTX 860M with 2GB of GDDR5 memory. This results in a 3DMark score of 5760, which makes it the leader in the performance charts of the group and more than capable of playing any number of previous years' games as well as some of the more modern titles.

The design of the Lenovo Y70 is really quite stunning. The brushed, dark-grey aluminium chassis, with red trims and sections of metal throughout is certainly an eye-opener. Lifting the lid reveals the red-backlit, full-sized keyboard that's raised ever so



▲ *The Lenovo Y70 is a singularly impressive gaming laptop*



▲ *It's the most expensive in the group and the highest scoring*

slightly from the rubberised palm rest and touchpad.

An odd design choice is the huge amount of space left bare surrounding the keyboard. The letter keys themselves are well

spaced if a little spongy for our personal tastes, but the numpad keys are noticeably smaller. With all that space to spare, perhaps the numpad keys could have been bigger?

Regardless of our own particular tastes, we have to admit that it is a wonderful looking laptop – the sort that embodies exactly what you'd expect a gaming laptop to look like.

One flaw we did come to notice quite quickly was the absolutely terrible battery life. Having a big touchscreen like this takes a fair bit of power, combined with everything else that's going on, but we expected it to last a little longer than one and a half hours.

We haven't mentioned the battery life of the other laptops purely, because the vast majority of gaming will be done when the laptop is plugged in. Gaming will suck the life out of any battery pretty quickly, and when testing the Y70 with *The Witcher 3* we only managed to get 45 minutes off a full charge before it reached the point where we needed to plug it into the wall again. In comparison, the other laptops lasted for at least three hours.

Despite the poor battery, this £1,000 gaming laptop is one of the most impressive we've ever played on. The large IPS screen is excellent, on a par with the Chillblast and Scan IPS screens, and its exterior looks pretty amazing as well. It's only £50 more than the Alienware model, but it's significantly better.





Scan 3XS Graphite LG157

Considering its price and the fact that it scored second place in the 3DMark 11 tests, the Scan 3XS Graphite LG157 is an excellent choice for a gaming laptop under £1,000.



MSI GE60 2PE Apache Pro

The MSI GE60 2PE is slightly slower than the Lenovo Y70, but it's also £95 cheaper.

The bigger screen and touchscreen capabilities of the Y70 may turn more heads, but we think the MSI Apache Pro may have the edge on the design and future proofing stakes.

How We Tested

Each laptop was tested with a number of games: *Witcher 3*, *Elite: Dangerous*, *Assassin's Creed IV* and *Skyrim*.

Furthermore, we ran 3DMark 11 and collected the average score after three separate runs of the benchmark.

| | MSI GE60 2PE Apache Pro | Alienware 13 Gaming Laptop | CyberPower Xplorer X6-7400 | 3XS Graphite LG157 | Chillblast Defiant 3 Mini 13 | Lenovo Y70 |
|------------------|-------------------------|----------------------------|----------------------------|--------------------|------------------------------|------------------|
| Price | £905 | £950 | £625 | £880 | £900/£809 | £999 |
| Screen Size | 15.6" | 13" | 15.6" | 15.6" | 13" | 17.3" |
| CPU | i7-4710HQ 2.5GHz | i5-5200U 2.7GHz | i7-4710HQ 2.5GHz | i7-4720GQ 2.6GHz | i7-4710HQ 2.5GHz | i7-4710HQ 2.5GHz |
| RAM | 12GB | 8GB | 4GB | 8GB | 8GB | 16GB |
| GPU | Nvidia GTX 860M | Nvidia GTX 960M | Nvidia GT 940M | Nvidia GTX 960M | Nvidia GTX 960M | Nvidia GTX 860M |
| HDD/SSD | 128GB SSD/1TB HDD | 500GB hybrid | 500GB HDD | 120GB SSD/1TB HDD | 1TB SSHD | 1TB SSHD |
| 3DMark 11 Score | 5740 | 3989 | 5210 | 5750 | 5710 | 5760 |
| No USB 3.0 Ports | 2 | 3 | 2 | 4 | 3 | 2 |
| No USB 2.0 Ports | 2 | 0 | 1 | 0 | 1 | 1 |

Component Watch

SSDs are all the rage, but mechanical hard drives are far from dead!

Mechanical hard drives might be going slowly out of fashion thanks to the ever-dropping price of SSD storage, but that doesn't mean you can count them out yet. Indeed, as cheap as SSDs have become over the last few years, the technology behind mechanical drives has continued to improve as well. If you want an ultra high-capacity hard drive for archival storage, a file server, or just to future-proof your system, there's never been a better time to buy into this mature tech – and in this week's Component Watch, we'll help you find the best price too.

Deal 1: Toshiba MD Series 4TB (PX3009E-1HP0)

RRP: £112.55 / Deal Price: £101

The Toshiba MD Series 4TB drive is a 3.5" SATA-III drive that successfully combines a low power draw with high storage capacity. At a smidge over £100 it's very cheap for a 4TB drive, but this shouldn't put you off picking one up – the Toshiba name counts for a lot where hard drives and quality are concerned. It also has a 128MB buffer and 11.3 watt active power consumption going for it, both of which are pretty good for an all-purpose drive of this size. At the end of the day, if you like the price there's nothing that should put you off here.

Where to get it: Ebuyer (bit.ly/1flllyfh)



Deal 2: Seagate Barracuda 4TB (ST4000DM000)

RRP: £123 / Deal Price: £105

Put plainly, Seagate make reliable drives at any price point and capacity. This means that this one worth a more than a little attention – especially since you get access to Seagate's DiscWizard software, designed to make upgrading to a large drive that little bit easier, as part of the deal. A 64MB cache and 5900rpm speed are both lower than Toshiba's model, though, so if your needs demand that you consider matters of speed over reliability or ease of use, it may not be your first choice!

Where to get it: Scan (bit.ly/1KAGTTN)



Deal 3: Western Digital Green 5TB (WD50EZR)

RRP: £154 / Deal Price: £140

Western Digital's Green drives are optimised for performance and power consumption over speed, which just one reason why this 5TB drive makes for an attractive purchase – though it's worth pointing out the pleasing price point too. As you'd expect, it's a little cheaper than the 6TB version (which we'll look at in a moment) and decent value for money, so if you're interested in high capacity at low cost, this 5TB version is definitely one to look out for.

Where to get it: Scan (bit.ly/1eBj9mN)



Deal 4: Western Digital Green 6TB (WD60EZR)

RRP: £200 / Deal Price: £182

The 6TB version of Western Digital's drives are some of the highest-capacity models on the market and, while there are versions optimised for surveillance and NAS use, the Western Digital Green line is great for desktop users – with low power consumption and low noise levels but high speed access. It comes with a two-year warranty as well, which suggests a reasonable level of confidence in the hardware!

Where to get it: CCL (bit.ly/1DPZSom)



Deal 5: Seagate Archive 8TB (ST8000AS0002)

RRP: £216 / Deal Price: £185

Cheaper, at least per-GB, than many smaller hard drives, the Seagate Archive is the highest-capacity consumer drive on the market. As its name suggests, it's aimed at archival storage tasks and thus has a low 5900rpm speed, so it's not ideal as a main hard drive – but it's definitely worth picking up if you're looking for a way to hoard all of your data in one place. That's even more the case when the discount is this good!

Where to get it: Dabs (bit.ly/1MygXeC)





The Download Directory

James Hunt scours the internet for the best freeware, shareware and paid-for application releases

This month, The Download Directory's collection of offbeat and largely unexplored applications includes Ginger, a replacement auto-correct and spelling/grammar checker for Windows; Honeyview, an image-viewing program that can replace your default image viewer with one that has real power; WIPE, a privacy manager that can hide the way you've been using your PC; and DataRAM RAMdisk, a program that lets you create and manage RAMdisks in Windows.

Ginger 3.7.29.0

Release Type: Freeware

Official Site: www.gingersoftware.com

The lack of a universal spellcheck is one of the few areas where Windows doesn't match up to most other operating systems. If you're the sort of person who relies on one to catch your errors, you might want to give Ginger a go.

Compatible with browsers, office applications and more, Ginger is a cloud-based spelling and grammar checker. That does mean you have to be connected to the internet to use it, but let's face it – most systems are connected whenever they're switched on these days, so let's not hold that against it.

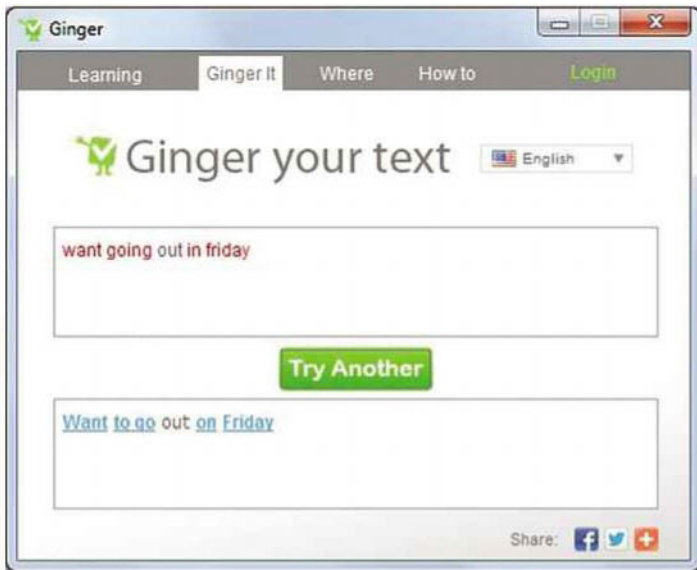
Installation is quick and simple, with the spellchecker picking the extensions relevant to your system as you work your way through the process. If you don't have Firefox, it won't suggest the Firefox

extension, and if you do, it'll be automatically selected. Once it's installed, you don't even have to do anything. Just type as normal, and errors will be highlighted or corrected automatically.

Ginger's strength is that it uses the cloud to source context, so it won't just look at the word you've misspelt and try to figure out what it was supposed to be; it'll pull context from its databases to determine what the most likely fit is, making it highly accurate. That also means it can spot words that are technically valid but have been placed in the wrong location. So if you use the wrong version of their/they're/there, whether/ weather or which/witch, there's a good chance this software will notice it.

Correcting an error is incredibly simple too. You don't have to perform a specific check or make a complex series of decisions – just hover over the error and instantly choose the suggested correction that pops up, or dismiss it if you're happy with the results. It's a click less than most!

Other tools include the ability to record and highlight grammatical errors you repeatedly make, so you can start to improve your linguistic skills, and a text-to-speech tool that will help you check whether what you've written makes sense to you aloud. There are customisable themes, a sentence rephraser, and even a translation engine, not to mention built-in emoji conversion. If you can think of a language feature you want,



there's a good chance it's included in Ginger – and as far as we can see there are no downsides.

Most of the features we've mentioned are in the free version, but it's worth pointing out that not all of them are. If you want to expand the software to its full functionality, you need to buy subscriptions for either \$6.40 (£4.10) a month or \$11.20 (£7.18) – neither of which is going to break the bank and both of which seem fairly reasonable given the sheer capability of the software. In the long term, it could become a problem, though, and the lack of any lifetime subscription (or even an annual discount) is all that's keeping this from being a five-star program.

Pros: A huge variety of high-quality features.

Cons: Subscription model pricing could stack up.

Rating: 4/5

Honeyview 5.12

Release Type: Freeware

Official Site: www.bandisoft.com

Now that every phone has a camera, it's not unusual to build up a huge library of photos on any PC, and getting those organised is difficult enough at the best of times. If you've tried to use it for anything more than the most basic tasks, you've probably noticed that the built-in Windows image viewer isn't the most well-rounded piece of software around, so if you're looking for one which has additional features, Honeyview might be the one to go for.

The software supports a huge range of file formats, from the usual suspects like BMP, JPG, and PNG, to proprietary formats like PSD, and professional-level formats like TGA and several different types of RAW camera data. Since its developer also makes archiving software, it has the build-in ability to view images within several types of standard archive folder, including the more obscure likes of LZH, 7Zip and ALZ. It can of course display animated gifs.

The image viewer itself has a decent amount of features: zoom controls, optional EXIF and metadata display, slideshow support (with a variety of transitions, if you want to use it as a presentation) and simply editing transforms like resize, flip and rotate included. If your picture doesn't quite look how you want, you can also make use of filters and processing options to sharpen, soften, brighten, darken and interpolate your picture in various ways. It'll even use GPS data to link you to the location on Google Maps, which is a feature sorely missing from many image-editing suites.

Navigation through the images is about as simple as it could be. The mousewheel, arrow keys and on-screen buttons can be used to step backwards and forwards through the images, while you can use the Ctrl key as a modifier to jump larger chunks of images if you're browsing a huge number of them. A scroll bar and bookmarks allow you to head to any specific point, and if you're not sure where you want to be, a thumbnail browser is only one click away at all times.

If you find images you want to keep, Honeyview has a built-in Saved Image Folder option, which allows a simple keypress or key combo to either copy or move an image into the folder you've specified. It makes it incredibly easy to both sort and categorise your pictures, or isolate just the ones you want to select without having to squint at thumbnails and filenames.

With a simple-yet-powerful interface that vastly improves on the default Windows viewer, it's hard to find much fault with Honeyview. If you want to download a copy, it has been made available in both portable and installable forms. It's so good, you'll be left wondering what the catch is – and in all honesty we can't find one. It's rare we'll call a program flawless, but this is as close to it as it gets.

Pros: Excellent feature set.

Cons: Nothing big enough to be worth mentioning.

Rating: 5/5

“ It's hard to find much fault with Honeyview ... It's so good, you'll be left wondering what the catch is – and in all honesty we can't find one ”

WIPE 2015.08

Release Type: Freeware

Official Site: privacyroot.com

The amount of information stored about us on our own computers can present a huge security risk, not to mention giving snooping housemates, friends and family members an insight into your life that you'd rather they didn't have. Keeping your computer use private isn't paranoia, it's just good sense, so maybe you need a program like WIPE to help you stay on top of it.

WIPE is a privacy tool, which practically scours your hard drive clean of activity that could reveal personal details and behaviours. As well as deleting the standard identifiers – web history, cached files and cookies – this program can also get rid of autocomplete data, clean out file indexes and delete recent file shortcuts that might deliver information into the wrong hands. It'll even delete program logs and thumbnails to ensure that more advanced users can't find out anything about you.

Support is built in for a huge library of programs, from media players to office applications to instant messaging clients. The data isn't just deleted either; it can be wiped in a military-grade manner, using the Gutmann standard, which rewrites data over 30 times to ensure even the most forensic attempts can't recover it. If you're trying to protect your privacy, there can be no better piece of software.



Betawatch

To help you stay on the bleeding edge of software releases, Betawatch is a guide to the experimental and unfinished versions of some of the most popular applications around. Can't wait for new features? Now you don't have to!

LibreOffice 5.0.0 RC4

www.libreoffice.org/download/pre-releases

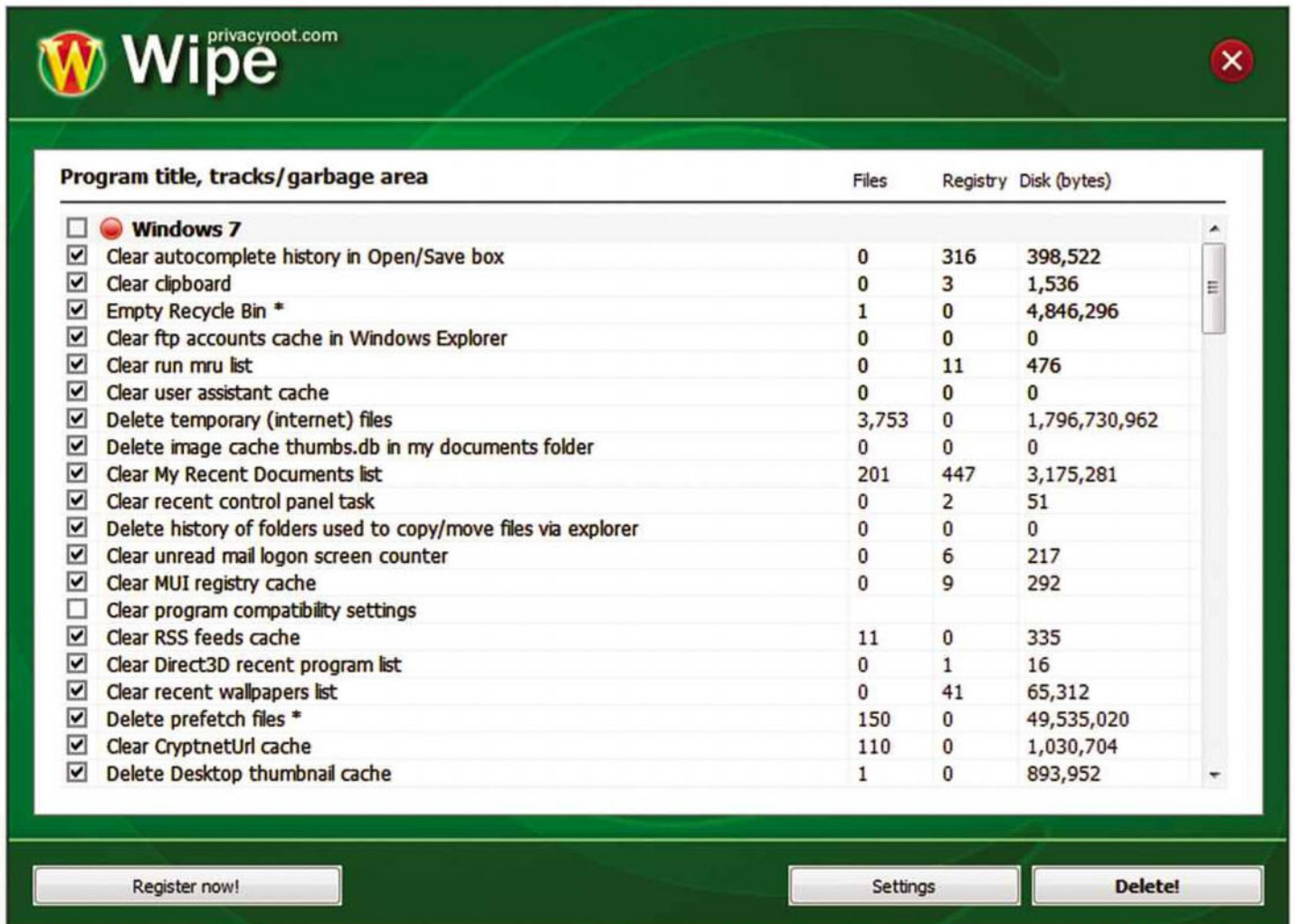
If you're hoping to update your office package when you install your free copy of Windows 10, now might be the time to hop onto LibreOffice, which is prepping for its next major update. There are a huge number of updates to the software – far too many to cover in exhaustive detail – but here are a few you might be interested in.

Writer has added support for emoji and in-word replacements, the ability to preview styles in real time, MS Word-compatible text highlighting, in-app image cropping, better support for RTF files, and improvements to toolbar and table management. A ribbon-type

interface has still not been added, so means it's good for people who don't get on with Microsoft's latest menu changes, but bad for anyone who wants to switch from a current version back to toolbars!

Calc (the LibreOffice spreadsheet tool) has improved conditional formatting, made improvements to the handling of Scientific and Number format, added better filters for XSLX files, overhauled the formula engine, added new functions for spreadsheet calculations, and improved the in-app image editor

The core functions have also improved PDF exporting, added support for Adobe Swatch Exchange palettes, and given the suite the ability to import older (pre-2009) files from iWork applications. All of these come alongside improvements to the interface with more streamlined toolbars, a new icon theme and better localisation. You can try LibreOffice for free, and by the time you read this, it might even be out of beta! Definitely an option worth looking at, especially if you're not keen on the pricing of Office 365 – not least because this is free!



Although the standard version is free, there's a premium version that adds extra features, such as rename-before-delete (which ensures files can't be recovered even if someone knows what the filename was) and the ability to exempt programs from the cleaning list. You also get online help and the ability to freeze updates, all for a one-off payment of \$14.95. It's not particularly cheap, but it can easily make its money back in time saved.

The only real problem with WIPE is that its interface is somewhat matter of fact. It's not the kind of application that holds your hand through any process, and while some users will like its no-nonsense approach, one suspects that as many will be alienated by its technical language and lack of hierarchy. Emptying the recycle bin is as easy as clearing your Prefetch files, despite the big disparity in the seriousness of those acts. Meanwhile, options like 'clear MUI registry cache' and 'Clear run MRU list' make no sense unless you're previously aware of the terms, and the program isn't going out of its way to help you understand them.

So while we like what it does and appreciate how well it does them, this isn't a program we can recommend without reservations. It occupies a similar space to applications like Piriform's CCleaner but is both more in-depth and less user-friendly. We suspect most people reading this magazine would be able to handle it, but at the same time, it'd be better for everyone if it only it was willing to make just a few concessions to novices here and there.

Pros: Offers comprehensive privacy almost unseen elsewhere.

Cons: Assumes a significant understanding of its behaviour without making concessions to beginners.

Rating: 4/5

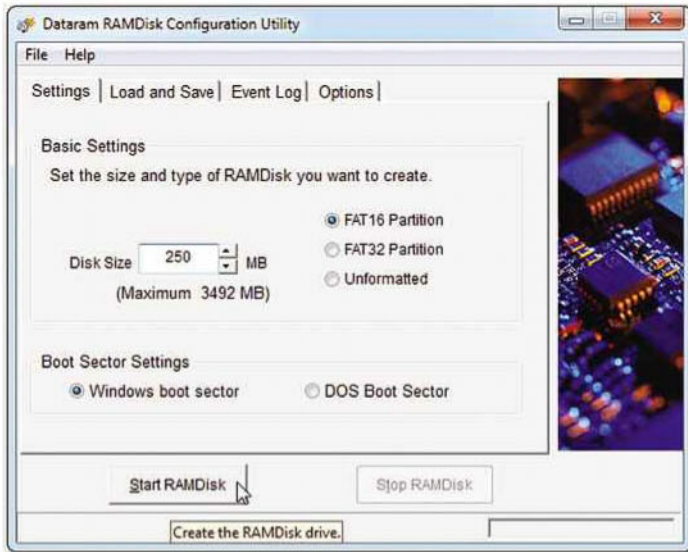
Dataram RAMDisk 4.4.0

Release Type: Freeware

Official Site: memory.dataram.com/products-and-services/software/ramdisk

No matter how fast your computer is, you're always limited by the speed of your data storage medium. If you can afford a decent SSD, this isn't a huge problem, but what about if you're languishing away on a churning mechanical drive that holds your computer back from reaching its full potential? One solution is to use a RAMDisk, but aren't they difficult to set up and administer? Maybe, but not if you use Dataram's RAMDisk software.

In case you don't already know, a RAMDisk is a portion of your RAM carved out for 'normal' storage; files can be permanently stored in RAM, allowing superfast access to their contents. Instead of being read off a hard drive into memory, they're already in memory, and that means the processor doesn't have to do any waiting to get at the data inside. Of course, in doing this, you reduce the amount of RAM available for normal use, and data stored in RAM is lost when you lose power – so



ReDownloaded

This month, in our regular retrospective section, we're looking back at the August 2013 instalment of Download Directory to see how the programs we reviewed have fared. Are they better? Worse? Gone completely? Here, we find out.

Undeluxe Home

www.resplendence.com

Reviewed Version: 2.00, Current Version: 2.00

Undeluxe is a file recovery and protection program (its name is a portmanteau of undelete and deluxe), which we felt, two years ago, needed serious improvement to make itself better than its competition. The developer evidently disagreed, because it hasn't updated it at all since. It's rare we encounter a piece of software that hasn't been touched since we last checked it out, but it's clear at this point that Undeluxe doesn't merit a re-examination.

Easy Duplicate Finder

www.easyduplicatefinder.com

Reviewed Version: 4.4.0.215, Current Version: 4.9.0.445

Easy Duplicate Finder's astonishing high price – \$39.95 – really put us off. That hasn't changed. The software is still being developed, though there aren't any major new features, so it remains a functional duplicate finder with a busy interface that's layered with intrusive pop-ups and works no better than a significant number of free alternatives. We can't think of any good reason to use this one, and that would be true even if the price wasn't so high. As it is, it's bordering on laughable.

Reflector

www.airsquirrels.com/reflector

Reviewed Version: 1.2.6, Current Version: 2.0.3

Just to prove we're not biased against all paid software, Reflector's price has actually gone up a few dollars (to \$14.99), but we think this screen mirroring software is better than ever. In fact, since we last looked at the software it's also started supporting Android, which makes it even more useful. Essentially it gives your PC the same capabilities as an Apple TV or Chromecast device – and that's something anyone with a tablet or smartphone is sure to find useful. We can't recommend it enough.

long shot. At the very least, try it out. You'll soon be able to tell whether it's working for you or not.

Pros: Simplifies a complex procedure well.

Cons: 1GB restriction makes it difficult to evaluate properly.

Rating: 3/5

So there you have it! A fantastic collection of programs this month, all of which earned the high ratings they deserve. Remember, if you have any programs that you'd like to see us look at – whether it's something you want to find, something you like and want to share, or even a program you've written and want us to review – don't hang around. Get in touch, and we'll make sure it ends up in the download directories everywhere – courtesy of The Download Directory! [mm](#)

using software like Dataram's RAMDisk will help you prevent disaster and keep you from going too far in the wrong direction, performance-wise.

The configuration utility starts by helping you create a RAMDisk, allowing you to choose the size and format of the drive. The Load and Save options ensure the contents of the RAMDisk always have a local backup, so accidental data loss is almost impossible, and there are even more options for keeping track of what's happening with your RAMDisk and how to keep it from causing trouble even as you appreciate its benefits.

Once the disk is created, it'll be accessible from within Windows as if it were a normal physical drive, at which point it's

“ **Advanced users will undoubtedly feel that it lacks features, while beginners might worry that it doesn't quite explain itself fully** ”

up to you to decide what you do with it. If you use a RAMDisk to run them, programs run quicker, cached files load faster, and games have a better framerate.

The only restriction on the software is that it can only create RAMDisks up to 1GB in size, which is only advisable if your system already has more than 8GB already in it. Nonetheless, if you have tons of RAM in your system and want to take the extra step, it's a one-off fee of \$14.99 to acquire the 'pro' version, which allows disks up to 32GB. That, at least, seems reasonable to us.

Of course, the program itself isn't doing a huge amount that you wouldn't be able to do anyway, if you're familiar with RAMDisks. It's really aimed at people who don't know enough to do the configurations themselves. Advanced users will undoubtedly feel that it lacks features, while beginners might worry that it doesn't quite explain itself fully, but it's a tough call to make, and it's not the least helpful program in the world by a

Remembering...

Play By Mail

This week David Hayward digs out his collection of postal order receipts

8-bit gaming was firmly established by the mid-80s; the rise of the ZX Spectrum, Commodore 64 and BBC Micro as home computers and entertainment units hardly needs going over again. However, as the digital world was booming, another form of gaming was beginning a slow decline.

Play By Mail was an interesting phenomenon in the 1980s. The concept itself was extraordinarily simple but very effective. As the name suggests, you had a game concept and rules as dictated by the game moderator. The game moderator would then announce the start of the game and post all the relevant documentation along with the rules and entry forms to the players. The players would receive the game's documents through the post and begin their go, usually by sending a postal order for a set amount to register themselves with the game.

The player's turn could be written down on a form, such as moving their army to the border of another player and taking the first shot. The game moderator in turn received the form and payment and made a note of it on the game board and informed the other players once he or she got all the other moves in place.

It was a long, drawn-out process, but ultimately it worked, and it fired the imagination of many a young teen.

Its History

Play by Mail or PBM, can be traced as far back as the 1950s in the US, with lengthy games of chess being played back and forth between gamers using the postal system. Who started it and what it started with no one really knows. There are plenty of suggestions, but they tend to end up in arguments over the true pioneer.

Regardless of who started PBM, the bug for conducting games over mail spread across the Atlantic, and soon we were enjoying matching our wits with others and eagerly awaiting the next move through the post.

PBM gamers were overjoyed with the launch of Flagship Magazine in 1983, which detailed current games and was used by game moderators from all over the country (and the world in some cases) to sell their next concept to potential players.

Unfortunately, due to the ever connected world we now live in and the fact that the cost of organising and posting of games is immensely high, Play By Mail has all but died out. There are a few examples still going, and Play By Email is taking up the mantle to some degree, but the art of sending off your final move to become crowned emperor of the Thorne Galaxy looks to have seen its last.

Did You Know?

- *It's a Crime*, by KJC Games, is still one of the most popular PBM and PBeM games going.
- *Vorcon Wars* was run by a Game Master on a ZX Spectrum.
- Your turn is heavily influenced by the actions of the other players. Often diplomacy was the best method of survival.
- There are still some fine examples going. Look them up and take part.

The Good

Amazing concepts. Tactical and diplomatic game playing needed to win.

The Bad

Could get expensive over time. Game moderators sometimes lost interest and dropped a game mid-play. Took an awful long time to complete a game (we're talking years in some cases).

Conclusion

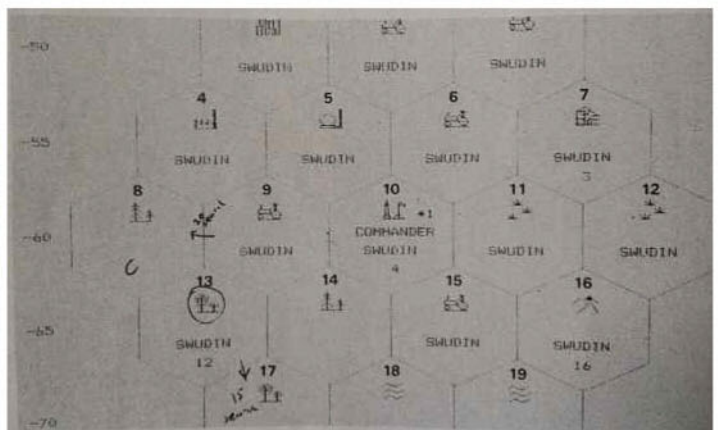
Play By Mail enjoyed many years of gaming between like-minded players. It's a lost gaming art, that's for sure, but it still exists online in some form or another. Who knows, maybe it'll return one day when the internet collapses?



▲ Flagship Magazine issue one, where PBMs discovered new worlds



▲ It's a Crime is still going strong



▲ The Vorcon Wars game sheet, as printed from a ZX Spectrum back in the day

RETRO ROUND-UP

The Commodore 64 gets another shooter, Repton returns to the Acorn Electron and Cronosoft releases two more Spectrum classics...
It's another Retro Round Up by Dave Edwards

Welcome to the Retro Round-up, where we take a quick goosey-gander at new games for the machines of yesteryear. This month we're jumping straight to the reviews; you'll find a new section at the end named Soapbox; and an occasional 'aside' that offers my take on particular developments in the retro world outside of the thriving software scene.

May The Force Be With You

First off the pile is *X-Force*, which is the big new release from Psytronik (www.psytronik.net), a nifty sideways-scrolling shooter with one of the highest difficulty levels ever. It's for the Commodore 64/128 and comes with the usual Codemasters-inspired inlay.

The game itself doesn't deviate from the regular format we're all used to, and gives you a craft that can fire small bullets directly forwards. Formations of alien ships thunder into the smoothly-scrolling playing arena. They come from above, below, in front and behind you and at supersonic speed – while, at the same time, an intricately designed series of obstacles occasionally force you to choose to fly along the top, the bottom or in the middle of the screen.

The puny weapon you start with can be upgraded by flying into blobs that appear. Catching them isn't easy as they float "in front of" the very obstacles you need to avoid. With practice, though, you'll see your ship upgraded with fireballs/lasers that cover a larger target area.

X-Force is very full-on; its stress levels left me wanting to seek medical advice, and never ceases to amaze me that developers make games this difficult. In *X-Force's* case, you need to remember exactly what alien ships appear at what points of the level. There's little time to react to anything on your first attempt and attack formations are not those of more lenient shooters – your enemies do not glide around the screen in graceful arcs. No, they dart about in patterns that are impossible to predict. The invariable result is therefore a collision, and a glut of "game over" messages.

Rather tellingly, all the screenshots you'll find promoting *X-Force* are from the early stages of level one. That's for good reason – you would need tremendous fortitude to get any further, and I suspect most people will just give up trying after a few goes.

This is quite tragic. *X-Force* is a well-produced, bonus-filled, reactive, graphical

extravaganza on which a team labored for years. In fact, slow it down 50% and it's hard to find anything to moan about. But on a real Commodore 64, when you don't have such an option, it'll have you hurling your joystick out of the window in five minutes maximum.

Repton Returns To The Electron

Repton is something of a retro-game icon; the thinking British man's equivalent of the American's boulder-dashing *Rockford*. In the eighties he averaged one new adventure per year but, like all the greats, he took a hiatus before getting a reboot for die-hard fans – the twice-as-mean and twice-as-difficult *Repton: The Lost Realms*. This game takes the best bits of the franchise and shakes them up with some new inclusions too.

The basic premise of the *Repton* games is to guide your lizard through an overhead maze, collecting up all the diamonds. Some diamonds are easily acquired; others are either in safes or placed alongside precariously-balanced rocks. Yet more may be supporting an egg, meaning they cannot be collected without releasing a monster. Even more may be placed in the corner of the maze next to



▲ *X-Force* looks the business – right down to the packaging – but is just too hard to be considered a fun game



▲ These screens come from very early in the game...



▲ ... for a very good reason: keeping our stress levels down!



▲ The artwork for the Electron incarnation of *The Lost Realms* is clearly inspired by its predecessors



▲ This Electron port features much of what made *Repton* good



▲ There's no getting away from the fact that it's not as pleasing as the BBC version, though

a growing fungus, meaning you need to high-tail it over there before the fungus cuts off access to them entirely.

The history of *Lost Realms* is as fascinating as the game itself. Originally *Repton 4*, it builds upon those familiar elements above with a raft of others. Notable additions are balloons (reverse rocks that float upwards), an ice pill to freeze any monsters released from their eggs and a pill-door combination in addition to the key-safe one. The wall-hugging spirits from *Repton 2* are also turned into two different types of nasty too.

Repton 4, with all of these new inclusions, was not considered viable, however. A half-finished version of it was shelved for twenty years before it found its way to Retro Software (www.retrosoftware.co.uk). Almost another decade later, the Acorn Electron version of *Repton: The Lost Realms* has finally appeared. The BBC Micro version of the same game was released five years ago.

So, has it been worth the wait? Well, that all depends on what angle you approach it from. If you're a hardcore fan, snuggle up to a cuddly *Repton* at night and can complete levels blindfolded, then probably yes. If you're new to *Repton* in its entirety, probably no. *Lost Realms* is very tough and it will likely make you very dispirited very quickly.

Also, there is no getting away from the fact that this Acorn Electron version is inferior to the BBC one. The level maps are the same but sprite size is smaller and less well-detailed, game speed slower (plodding rather than fluid) and music non-existent. To be fair, this has always been the case with the Electron versions of the game because the BBC includes a hardware scroll chip that the Electron doesn't have. Implementing software-scrolling takes up valuable

memory and that memory has to come from somewhere, leaving less memory for sprites. Changes that significant then require almost an entire rewrite.

Mind you, you do have to give the boys at Retro Software marks for perseverance. They've disassembled the original code, attempted to finish it, abandoned that idea, written their own code based around the original code as prototype, designed their own level sets and editor tools... One might have thought, after all that and the release of the BBC version, that they would have called time on the project and had a well-deserved rest. But no, they have instead repeated the whole process here, simply to cater for those ten people who might want to play it on an Electron instead! Bravo.

After such an epic struggle, I now come along and bash it for being too slow, too complex and too difficult. Shame on me. Alas, it is all of these things and, whilst the packaging and inlay is superb, the additional elements of the game take the idea that one step too far. Sometimes, less really is more.

To finish on a positive note, though, the BBC version is a much brighter and speedier number. As the two versions cost exactly the same, plump for the BBC and you'll be playing the lost realms of *Repton* as I suspect Retro Software originally intended. Both versions cost £5/£7 on tape/disc.

All The Fun Of The Fair

A new game for the Spectrum 16K, and a fully-featured imagining of *Theme Park*!?! Surely not?

Oh yes! Cronosoft's Jonathan Cauldwell has done it again; he's created another unique game that mixes arcade elements with strategy and decision-making. As if it needed saying, you're in charge of a large

plot of land and your mission is to construct the next big family attraction – and not go bankrupt in the process.

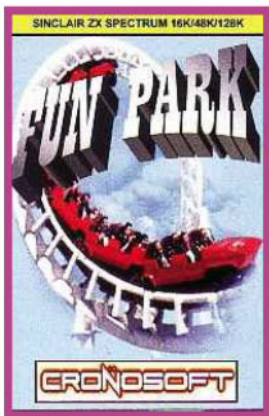
If you've glanced at the screenshots, I know what you're probably thinking: *Fun Park* has the appearance of a game from 1981, an era where the 8x8 CHR\$ definition was king. You'd be right, too. It's a fact that, unfortunately, will put many people off. So pay attention when I comment that, had the game been released in that era, it would have been so ahead of its time that it may well now be remembered with the same fondness as *Football Manager*.

Fun Park requires instructions as to its use – there are none on-screen and no prompts outlining what keys to press. However, the navigation keys are easy enough to use and once you realise key 1 lays a path, you've taken your first steps to building an entertainment utopia.

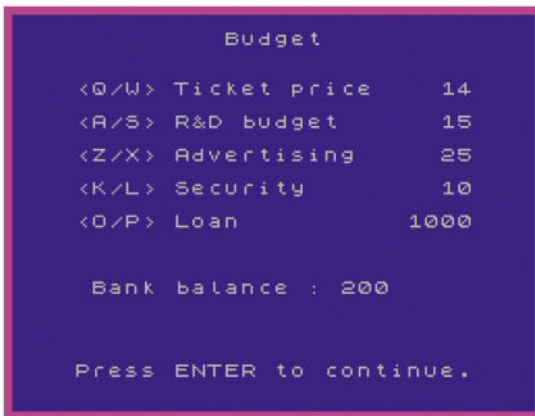
No-one will bother to visit your park until you build at least one ride, and you build all rides (of which three are available at game start) by bringing up a blue selection screen, paging through those available and selecting with key M. Oddly, ENTER is used to abandon the ride-hunt rather than to confirm.

Once you have a ride, you need to construct a special type of path (key 2) to its entrance and exit. These paths only work if you connect them vertically. That's easily enough done, but will lead you to discover the game's biggest drawback if you get it wrong: that it's not possible to erase any mistake you make or the position of any ride you place. The instructions explain that, working with only 16K, there just wasn't any space left to include this feature. That's perfectly valid – but it has obvious ramifications.

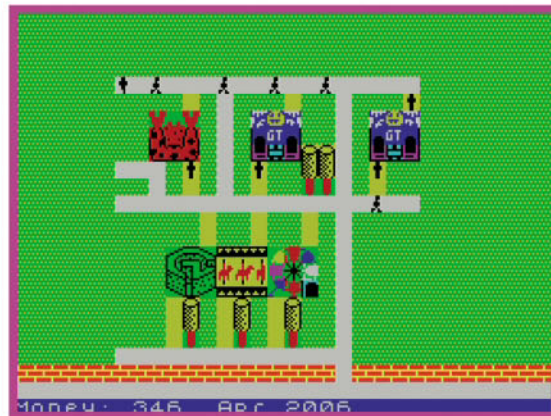
Your limited finances restrict you initially to a few trees, a few rides and



▲ Fun Park squeezes loads into just 16KB



▲ You can control how your park works through the blue-screen menus



▲ I'm particularly proud of the trees

paths between them. Fortunately you can increase ticket prices to generate more income and, once you've worked out that you must set these in proportion to how 'good' your park is – and resist the urge to be too greedy – you'll start to understand the mechanics of this interesting game a little more.

That's really the whole point. Running a successful park isn't easy – money is tight and there are always new rides to research, new customers to attract, new security to invest in and new paths to lay to connect everything together in a way your guests will appreciate. If your park is struggling, you can also take out a loan (on which you'll pay interest) and try and dig yourself out of the red. Despite the loan facility, the game is rather harsh in declaring "You're bankrupt!" should you end the month without enough cash to pay everyone's salaries. The skill is, therefore, working out how to run the park profitably.

Fun Park is available for £2 as an emulator file only from cronosoft.co.uk.

Retro Find Of The Month

Telly Heroes is another Cronosoft game and, from its packaging, I thought it would be a quiz game. It's not; it's a strategy game in which you take over a completely fictional British Broadcasting Corporation and then decide what programmes to broadcast. The aim is to make a mint, flogging off DVDs of your favourite shows, selling advertising on your channel and providing a whole range of services like interactive TV and teletext.

This type of game won't appeal to everyone but, even if it's not your thing, you can't help but marvel at the sheer amount of features it includes – and the finesse with which it has been put together. The majority of it, it has to be said, is text-based. So that means reading menus, reports, TV schedules and other information from the get-go. Fortunately it's made exciting by telephone complaints (usually about bad language pre-watershed), media breaks and graphics of all those aspiring celebrities desperate for your employment.

Telly Heroes is peculiarly British and that's really great – if you are British. When

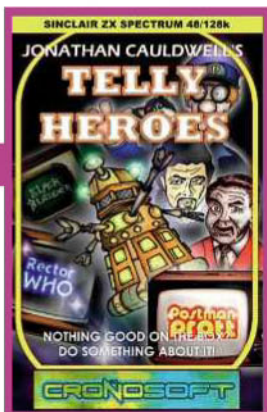
commissioning your new series – which can be called whatever you like and be of whatever genre you wish – a whole swathe of famous faces are at your beck and call. All are not-so-subtly altered so, while you won't find Amanda Holden waiting to take the lead in your new show, Amanda Holden will be pleased to do it in her stead.

If you're not a stalwart British TV fan however, there's less for you as you simply won't intuitively understand the game in the same way. The reason I say this is that a lot of the game's 'humour' isn't laugh-out-loud funny, it comes from your own intuitive pairing off of genres and celebrities that don't match. Why not commission a new series of *University Challenge* hosted by Jade Giddy, for example? If you're British, the idea will raise a smile. Furthermore, if the show goes on to succeed, and gains immense viewing audiences and a steady trade of DVD sales, you will take from this whatever you brought to it when deciding to do it in the first place. For non-Brits, all of this is lost; it becomes a simple pot-luck choice without meaning anything at all.



▲ Running from left to right diagonally, CPC-Power.com is now watermarked across every cover scan

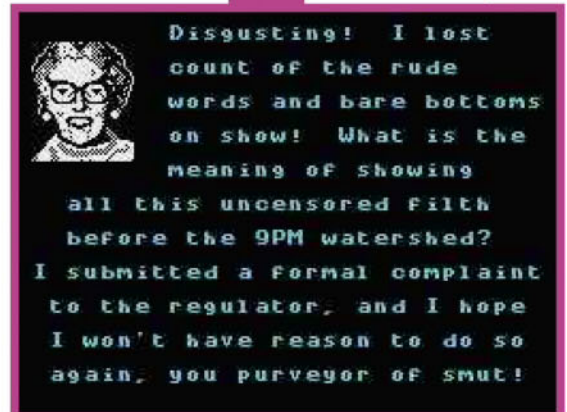




▲ "Nothing good on the box? Do something about it!"



▲ Jade Giddy fronts University Challenge. It might work, right?



▲ Take care not to offend Her Majesty

I have no idea of what logic *Telly Heroes* employs to determine success and, strangely enough, I don't really care. Probably the worst thing you could do with *Telly Heroes* is actually try to take it seriously. It's a fantastic, albeit totally ridiculous, concept for a game – but one that is as fascinating a departure as you can imagine from the norm of retro game releases. A perfect way of wasting time, you can get it from Cronosoft for a very reasonable £4 (+P&P).

Soapbox: When Retro Goes Bad

The Internet was built to be open and the world of retro gaming truly represents a medium that the Internet was made for. It allows collectors to find things, programmers to make things, gamers to play things and archivists to preserve things. Almost every computer ever created has claimed its own corner of cyberspace – and the bigger the machine, the more complete the on-line archives for it are.

One of these retro machines, the Amstrad, was a phenomenon across Western Europe and the website CPC Power (www.cpc-power.com) has over 12,000 (!) cover scans, screenshots and inlay cards to browse. Four weeks ago there was a change, though: its webmaster announced that "due to the constant plundering of its resources without due recognition, it would henceforth be watermarking all of its images". The result: A huge diagonal "CPC Power" stamped across every last scan. It's one of the biggest mistakes I have seen an archive site make and, before we get to this month's new releases, I'll explain exactly why.

Firstly, if you obscure an image, you disconnect the viewer. We don't stamp *Micro Mart* diagonally across the pictures

that illustrate our reviews for that reason. No-one wants to see things that way. It ruins ambiance.

Secondly, if you are laying claim to your 'version' of a retro game, where does that claim end? You've effectively created a new inlay for it with your logo on. Why not protect it by also doctoring loading screens and/or credits pages too? Indeed, maybe you should make your downloads only work with an 'official' emulator embedded into your site?

Thirdly, the Internet is about sharing information, be that images or whatever, with the world. To do the equivalent of taking a poop on those images – because you're worried about people stealing them because they are so good - is 'solving' the problem by actually destroying the very image you created! That flies in the face of providing the images in the first place.

To get an idea of where CPC Power is coming from, you need to see it from its perspective. Most retro gaming websites have smallish images and instructions converted to html, whereas it hosts big, high-res images. The open nature of the web will mean that all those people clicking Save Image As are costing it in terms of bandwidth. As someone who runs an archive site, I know it is also gut-wrenching to see your years of hard work ripped off on other sites.

Yet, as someone who collects Amstrad games – and, indeed, one of those plunderers of many an archive site over the years – I do think CPC Power is overstating the case. The fact is that, if you're about to sell an Amstrad game on Preloved or eBay, it's much easier to do a google image search than faff around with your camera. Intrusively watermarked images will indeed stop you saving them, but more likely you'll then either do the faffing or find the image elsewhere. If the latter, it will be unwatermarked and in good supply if CPC Power's images have been plundered to even half the extent it is claiming.

So essentially, what watermarking actually does is drive visitors away. There is even a precedent. Remember the watermarked images of cover scans on DragonWiki? No? Precisely. Because everyone preferred the unwatermarked ones on The Dragon Archive, which quickly became Dragon fans' destination of choice for precisely that reason.

I don't hold out much hope of CPC Power reversing its policy any time soon either. Which is a great shame.

Au Revoir

That's all for this issue. Perhaps by next month I'll have built my perfect Fun Park. Well, all apart from that one tree that I can't erase, of course... [mm](#)

| | | |
|--|----------------|-------------------|
| Cronosoft (www.cronosoft.co.uk) | | |
| Fun Park | Spectrum 16K | £2 |
| Telly Heroes | Spectrum 48K | £4 |
| Retro Software (www.retrossoftware.com) | | |
| Repton: The Lost Realm | Acorn Electron | £5/£7 (tape/disk) |
| Psytronik (www.psytronik.net) | | |
| X-Force | Commodore 48 | £5 |



Microsoft Surface

Laptop Replacement Or Desk Surface?

Can a Microsoft Surface really replace a laptop? **Chris Salter** investigates

Microsoft released the Surface range of tablets back in 2012. They were tablets, running Windows 8, designed to show the tablet functionality of the Windows 8 system. However, these made use of Windows RT, a full version of Windows 8 that was programmed to work on ARM-based processors and didn't run on the standard x86 processors used in PCs, and so were limited in the ability to work with normal programs. This meant that the Surface didn't really appeal to all but the diehard Windows users and were essentially tablets solely for using Office. Microsoft had written the Office suite to be used on Windows RT and the Nvidia Tegra powered tablets, but the majority of the other software available for computers cannot run on this architecture and therefore was rendered useless. The tablet never really took off, although it did receive reasonable reviews here and there, but the biggest flaw was its incompatibility with normal programs.

“ The Surface looks to match any Apple designed product in terms of quality ”

Fast forward a few years, and Microsoft is advertising the Surface as the tablet that can replace your laptop. This isn't a new claim for tablets. People have suggested that the iPad can replace a laptop in general, but once you get past casual gaming, browsing the internet and social networks, the iPad can struggle to provide a proper laptop replacement for office (or even home) users. And while Microsoft has released Office on the iPad, it's still a limited version and doesn't do everything the desktop version does, and trying to edit an Excel spreadsheet on an iPad is a lesson in patience.

So can the Microsoft Surface really replace a laptop? I thought I'd have a go and find out.

What Surface?

Microsoft currently has two different versions in the Surface lineup: the Surface 3 Pro and Surface 3. Both run Intel processors (the Pro version using the i series of chips, while the standard

version makes do with an Atom processor). Both versions run Windows 8 (but will be updated to run Windows 10 when it's released in July) and come with a range of different solid-state storage options. This can be seen in the following table:

| | Surface 3 | Surface 3 Pro |
|-------------|-------------|---------------|
| CPU | Intel Atom | Intel i3 – i7 |
| Screen Size | 10.8" | 12" |
| Resolution | 1920 x 1280 | 2160 x 1440 |
| Storage | 64GB-128GB | 64GB to 256GB |
| RAM | 2-4GB | 4-8GB |

Prices start at £419 for the Surface 3 basic model and £639 for the basic Surface 3 Pro. These aren't the cheapest tablets available, but the basic one competes with the cheapest iPad Air 2.

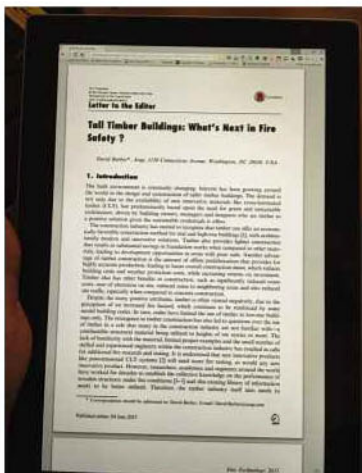
I tested the Pro version, so I had the faster processor and larger amounts of space and RAM available.

It should be noted that while Apple offers all the iPad models with a SIM card option, only the cheaper Surface has the ability to use a 4G SIM card for mobile data access.

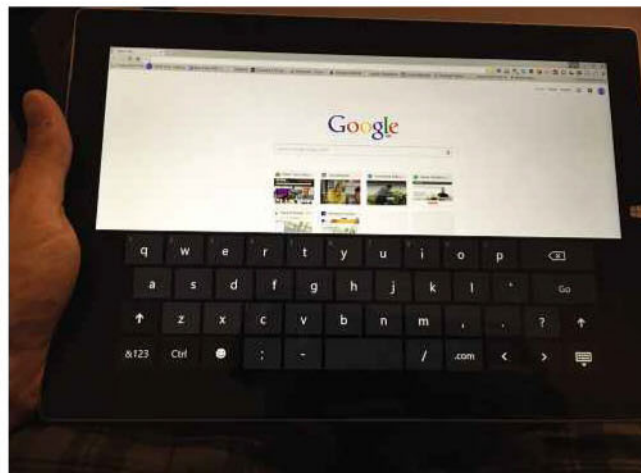
Both Surfaces come with the standard ports you'd expect of a laptop. Both have a single USB 3.0 port for connecting USB peripherals – useful for connecting pretty much anything, although with a single USB port, you might need to carry around a USB hub if you need to connect more than two USB items at once. However, this is needed on similar laptops, such as the new MacBook, which requires an adapter for all devices, thanks to its USB-C port.

Both Surfaces also contain a micro-SD slot, capable of taking micro-SD cards of 200GB so you can add in additional storage over and above that on the SSD at a later date. Those that want to save money may want to look into getting the Surface with a smaller internal SSD and using portable applications or just installing programs to the micro-SD card, since none of the parts of the internals are upgradable at a later date.

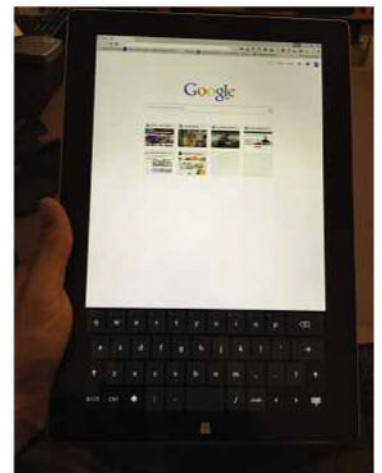
Charging is achieved via a standard micro-USB cable – no more searching for specific laptop chargers if you misplace one! However, like the iPad, the charger is a 2A charger and while it could charge on a standard phone charger (if not in use), it will charge quicker with a 2A charger.



▲ Reading PDFs on the Surface



▲ Google Chrome running on the Surface



▲ Web browsing in portrait mode



▲ The Metro interface works well on the Surface

The Surface can use multiple displays and can output its screen (as you might expect from a laptop) via a Mini Displayport so if you intend to connect to a projector, you may require a VGA adapter.

Usage

The Surface looks to match any Apple designed product in terms of quality. While slightly larger than an iPad (certainly for the Surface Pro) and heavier than the iPad, it's still light enough to carry around and to use day to day. It feels lighter than a lot of the laptops I've used, so one of the aims of the Surface has been achieved (as a laptop replacement).

Starting the Surface, it booted quickly – not as quickly as starting the iPad from sleep, but it was certainly as quick as starting the iPad from a cold start (but does anyone turn the iPad off unless they have to?). On boot, you're greeted with the standard Windows desktop and, as this is Windows 8, the Metro interface. As this wasn't my Surface, I didn't have to set up the Surface from scratch by creating an account or doing the standard form filling when getting a new PC, but I have been informed that this is the case, and you set it up just as a new PC. As it's a full Windows machine, you can add and remove users as needed from the Control Panel, so if you have a single tablet for the entire family to use, you can now have individual accounts – something the iPad and, to my knowledge, Android don't have. No longer will you have to be concerned with another family member accidentally destroying data that they shouldn't!

As a full Windows 8 device, you can connect the Surface to NAS devices and other items on theyou network extremely easily. Frankly, it put the iPad to shame in how easy I could access my music and videos on my NAS! I was also able to edit files directly on the NAS itself and was able to use Dropbox to sync my files to and from the Surface. The iPad version of Dropbox only lets me access my files and doesn't have automatic synchronisation. With Microsoft Office installed, I was able to access all the office documents as well. For me, one of the best things the Surface allowed me to do was to browse A4 PDFs as a full page, due to the extra size, in portrait mode. This was a fantastic help for reading academic papers, which I have to do fairly regularly. Obviously, the smaller Surface may restrict this slightly, but the Pro version was great. I would have no problem using the Kindle App on here as well as using it as an ebook reader in a push (I still prefer the

Kindle) and because it's Windows, you can happily run Calibre on the device and fully manage your reading library!

In general, it using as either a laptop or tablet was perfectly adequate. Moving between portrait and landscape while in tablet mode meant the screen moved as one might expect, though in general, using Windows in portrait mode was a bit frustrating – a decade of widescreen monitor usage makes getting used to the narrow space difficult. Yet, as above, it makes reading documents a breeze. In fact, I would have liked to have seen the keyboard allow me to place the tablet in portrait mode for writing, as it would be nice to have a full Word document visible in the screen at once.

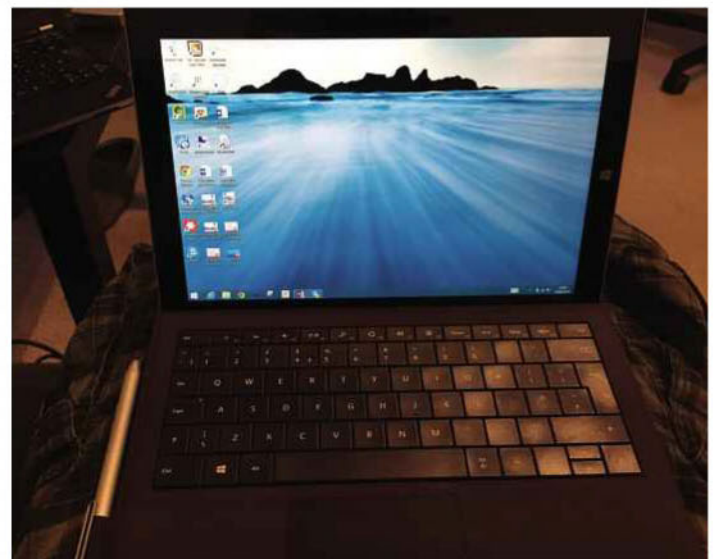
Keyboard

To make the Surface a laptop replacement, you need to provide a keyboard. Microsoft does sell a keyboard for the Surface, but this is an optional extra (which is never the case with an actual laptop!), which naturally means added expense.

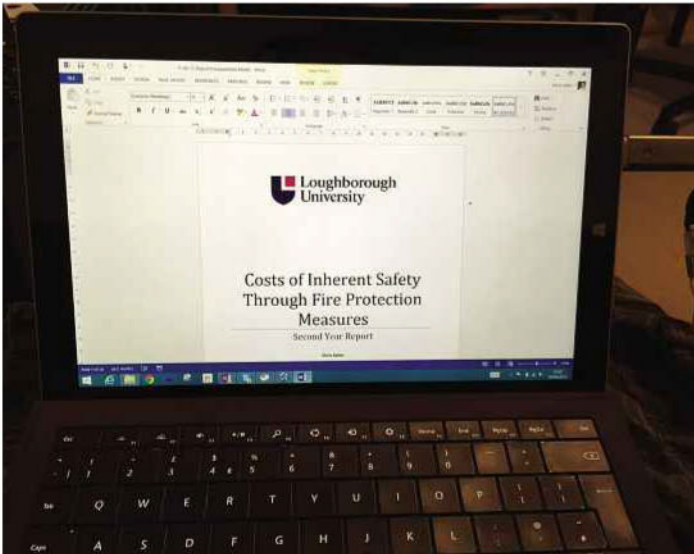
However, the keyboard does work flawlessly with the Surface, which to be honest, considering the price, you would expect.



▲ Surface using a USB stick



▲ Surface being used a laptop



▲ Microsoft Word running natively

The keyboard attaches magnetically to the base of the Surface (so you can only use it in landscape mode, rather than portrait, which some iPad users might like), and it connects via exposed connectors, so there's no need for relying on Bluetooth. Once connected, it replaces the on-screen keyboard automatically, similar to iOS, where the keyboard will hide itself when connected to a Bluetooth keyboard.

The keyboard does contain a touchpad and buttons as well, turning your tablet into a laptop. The keyboard itself isn't the

“ It put the iPad to shame in how easy I could access my music and videos on my NAS ”

nicest to type on, but when you see how thin the cover (and therefore, the keyboard) has to be, you can forgive Microsoft, as it would have to cut corners somewhere to allow this to still be thinner and lighter than other laptops on the market. With the cover and tablet together, I think the new Apple Macbooks still trump the Surface in terms of thinness, but at the end of the day, they don't convert into a tablet and are still cost more than the Surface Pro and keyboard cover!

Pen

The Pen (or stylus) is an optional extra with the Surface 3 but is included with the Pro. Of course, you might never use a stylus with a laptop or tablet, but in the tablet mode, the stylus can really provide benefits. I was amazed to discover that the stylus blocks input from your hand, so you can happily rest your hand on the Surface while you take notes. It means you can actually handwrite notes comfortably. It meant that in OneNote I was able to handwrite everything that was being discussed in a meeting.

In addition, the stylus provides a measure of pressure sensitivity. While perhaps not as good as attaching a Wacom tablet to the Surface, the basic Microsoft stylus does extremely

Options

The Surface has a number of optional accessories that you can purchase along with it. Some of these vary from extremely useful to nice to own.

For example, the keyboard cover is almost essential if you want to use the tablet as a laptop replacement. While a separate Bluetooth keyboard would work just as well, the Surface keyboard allows you to use it as a cover for the Surface but software support is built in (so it clears the on-screen keyboard when attached and it includes a trackpad).

The stylus is an optional extra for the Surface but is included with the Pro version.

Microsoft sells a dock that allows you to hook your Surface up to desktop peripherals such as a keyboard, mouse and monitor. This would allow you to make use of the portability of the Surface and then set it up as a desktop machine when you either get home or to work.

Battery Life

The battery life isn't the best on the Surface Pro, certainly in comparison to the iPad, which features a battery that could last all day. I could certainly spend two evenings with the Surface on battery, but I'd also be switching it off when I was done; the iPad could be left on all day and work for at least three days on a single charge.

well in responding to pressure in specific applications that support it (OneNote being one).

As a Bluetooth stylus, this does require batteries – either a single AAAA or two 319 coin batteries. I wasn't able to test the battery life of the Pen over the course of my testing.

Conclusion

To my mind, the Surface functions somewhere between a laptop and a tablet, but I wouldn't say as one or the other it excels. For example, as a pure tablet, it is reasonably heavy, and you wouldn't be sitting in bed with this above your head browsing, and occasionally using a full blown Windows operating system actually hinders it when the programs you're using have been modified for a touch-screen interface. However, with the keyboard attached and in use as a laptop, this isn't an issue. The Metro interface to Windows 8 really makes much more sense on the Surface, and I found using the iPad afterwards restrictive. In general, as a laptop, the Surface is extremely good, though I had some issues with the 'multi location' stand at the back, in that I could only seem to get one location. The cheaper Surface has three angles, while the Pro apparently is fully adjustable, but I just couldn't get this. Likewise, using the Surface on my lap produced wobbles, though it was more stable than I expected, but less so than I would have wanted – I'm typing this article on the train on my Thinkpad on my lap, and I'm not sure I'd have risked the Surface in a similar situation.

However, I believe that while it's perhaps not the best at either the tablet or the laptop function, it does perform extremely well in each function, and I believe that, yes, Microsoft's claim of replacing your laptop with a single device is entirely justified. In fact, I may have to save for one as my next computer purchase! [mm](#)



PC Sticks What's Available?

**David Hayward looks at the smallest
PCs around at the moment**

In recent years, we've seen the PC shrink dramatically in size. From the standard desktop, to a far smaller media capable machine, to a box you could hold in the palm of your hand – and now to a PC that's not much bigger than a USB flash drive.

CES 2015 was where we were first introduced to the Intel Compute Stick, and since then we've had a slew of other manufacturers matching the specifications and adding one or two tweaks and features of their own. However, the USB stick sized PC wasn't invented with the Compute Stick; there have been various attempts in the past by Chinese manufacturers to squeeze enough performance into the dimensions of a stick. It's only recently, though, that x86 PC sticks have become a serious alternative to ARM-based Android ones.

Let's look at what you can get...

Intel Compute Stick

Since we've already mentioned the Intel Compute Stick, it seems a logical place to start.

The Intel Compute Stick is a pocket-sized powerhouse, with an 1.33GHz Atom Z3735F quad-core processor, 2GB of 1333MHz DDR3L memory and a choice of either 32GB of eMMC storage with Windows 8.1 Bing Edition installed or 8GB of eMMC storage with Ubuntu 14.04 LTS 16-bit. The Ubuntu version isn't available just yet, although it's most likely will be within days of us writing this.

The list of specifications go on, with an HDMI port built into the front of the stick (much as a USB port is built into the front of a USB pen drive), 802.11 b/g/n wi-fi, Bluetooth 4.0, a full-sized USB 2.0 port and a micro-SD card slot. You'll also find the power button and mini-USB power port that connects to a 5V 2A plug.

Obviously the good points of the Intel Compute Stick are the fact that you have a 'proper' x86 PC that is great as a media centre or for browsing, for as little as £125. Again, we don't yet know how much the Linux version will cost, but rumour is it's likely to be a bit cheaper. However, the processor can't be expected to match performance with a desktop, so heavier tasks are definitely out.

What you get is tablet-like performance, which although good, won't exactly allow you to play *Fallout 4* when it's released.

Hannspress Micro PC

The Hannspress Micro PC has been available for a few months now, beating the Intel Compute Stick to the shelves and striking while the iron was hot and people were still going all potty over stick-sized PCs. It was a clever from Hannspress, especially since its Micro PC was exactly the same specification as the competition.

Indeed, you'll find the same Atom Z3735F quad-core processor, 2GB of memory and 32GB of eMMC storage with the Bing Edition of Windows 8.1 installed. There's no mention of a Linux version or that there will be one in the future, but the BIOS is an



▲ The Intel Compute Stick, the PC stick that got everyone excited at CES

8MB Insyde UEFI, so it does make you wonder if it's possible to install a version of Linux. We haven't tried it, and we don't know anyone who has, but we assume there's some clever person out there who has done it and posted the video on how you can too.

The Hannspree Micro PC came in a little more expensive than the Compute Stick. It was £170 or thereabouts, but can be bought from the likes of eBay for around £120. In the

“ CES 2015 was where we were first introduced to the Intel Compute Stick ”

end, it all depends on whether you want an Intel product for £5 or you're perfectly happy with identical hardware from another manufacturer.

We liked our brief time with the Hannspree Micro PC. It ran well, and we had it as an emulation gaming machine for retro gaming.

MeeGoPad T02 Mini PC

Naturally, since the bigger names have stick PCs out and on the shelves, it's inevitable that the lesser-known Chinese imports will suddenly appear with versions with a similar spec.

The MeeGoPad T02 is one of the better imports you'll find on the pages of eBay and import sites. Not surprisingly, it's exactly the same specification, even down to the weight, as the Intel Compute Stick and the Hannspree Micro PC.

However, there is a small difference here that might make the MeeGoPad a little more tantalising than the competition. As well as the 32GB eMMC storage version, you can, if you're lucky, find a 64GB eMMC model floating around the corners of the internet.

And to add to that, the MeeGoPad T02 also comes with a choice of either Windows 8.1 or Ubuntu and the free update to Windows 10. Plus it has an extra full-sized USB 2.0 port.

Finally, you can pick one up for around £60 or £70 depending on where you shop and how lucky you are, and if you've managed to spot one before the price has been changed or 20 other people have got there before you.

So what's the catch? Well, although cheaper and with some better hardware, to some degree, the MeeGoPad T02 isn't exactly renowned for arriving at your door in a working condition. There have been reports of units shipped with no OS and no means

Windows 8.1 Bing Edition

We've mentioned Windows 8.1 Bing Edition a few times here, but what is it?

The Bing Edition of Windows 8.1 is simply the cheapest possible Windows OS to have installed on any device. Previously, the cheapest edition was the Core Edition of Windows 8, but apparently when Windows 8.1 was released Microsoft changed things around a bit, because it likes doing that, and it made the Bing Edition the cheapest.

How cheap is cheap, though? Well, it's pretty cheap, in that it costs nothing for a computer manufacturer to ship a PC, laptop or any other device with the Bing Edition installed.

The Bing Edition, though, has a set requirement, in that the computer manufacturers have to ship the OS with the default search engine as Bing for Internet Explorer. That's it. You, as the users, once you've got hands on the system, can change to whatever browser and search engine you like, but the manufacturer has to make sure that the OS points to Bing for internet searches.

So now you know.

to install one; faulty power units, no power units, wrong plugs, cracked casing and in one case (the forum entry for which has since been removed) shipped with a virus and various key-logging programs installed.

In short, order and use at your own risk. You can't believe everything you read on the internet, so maybe these were false reports.

Lenovo Ideacentre Stick 300

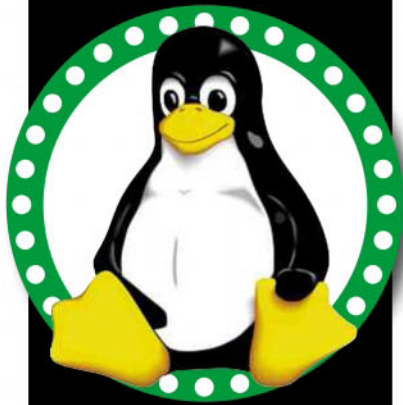
Not to be outdone, Lenovo has entered the PC stick market with its Ideacentre Stick 300.

The Stick 300 is due out toward the end of July, so you might be able to pick one up from a supplier in the U.S. by the time you get to read this. As to what the specifications are, surprise, surprise, we've got the all-too familiar Atom Z3735F, 2GB of memory and 32GB eMMC storage on to which you'll find a copy of Windows 8.1 installed with the option to upgrade to Windows 10 when that time finally comes.

The price is set to come out at around £149, which seems a little too expensive considering the competition is already out and available for a good £20 or so cheaper. Mind you, this is Lenovo, which tends to appeal to more corporate users as opposed to the average consumer, so maybe there's some kind of bulk or business deal involved depending on what your credit with the company is like? [mm](#)



▲ The Hannspree Micro PC came out first, beating Intel to the shelves



David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Linux 4.2 RC4

Updates due for Linux 4.2 kernel

Linus Torvalds recently issued a message regarding the release of rc4 for Linux 4.2:

"Another week, another rc. I really wish that things were calming down, but it hasn't happened quite yet. It's not like this is particularly big or scary, but it's also not at the stage where it's really starting to get quiet and the bugs are really small and esoteric.

So we still had some bugs due to the low-level x86 asm cleanup work and the 32-bit compat 'syscall' instruction (only used on AMD) was subtly broken. That should be all fixed now, so if you run a 64-bit kernel and have 32-bit user space (including things like wine. etc.) and saw problems earlier, go ahead and update.

Of course, please go ahead and update even if you didn't see problems, just to test the new rc.

Other than that issue, it's mostly drivers and networking. USB, gpu, mmc, network drivers, sound. With some ARM noise (but even that is mostly driver-related: dts updates due to MMC fixes). And a few small filesystem fixes.

Go forth and test,

Linus"

It's certainly quite interesting to those who are on the cutting edge of kernel testing, as well as those who simply want to keep up to date with what the future kernel will offer.

Kernel 4.2 has a number of additions and features that will help bring Linux into more focus across several different developments. For one there's going to be better AMD GPU driver attention, focusing on

supporting the Radeon R9 285 Tonga and future GPUs.

There's also support for different video encoders and better GPU support for QEMU guests too. The x86 assembly code has been cleaned up and

Needless to say, some of these gaming-related improvements are thanks to Valve and the company's push for support for SteamOS.

And finally, there's much improved support for UEFI

“From a gaming point of view, the updated drivers certainly are welcome”

promises to yield better system performance. And newer ARM boards and SoCs have support through better integration with their cores.

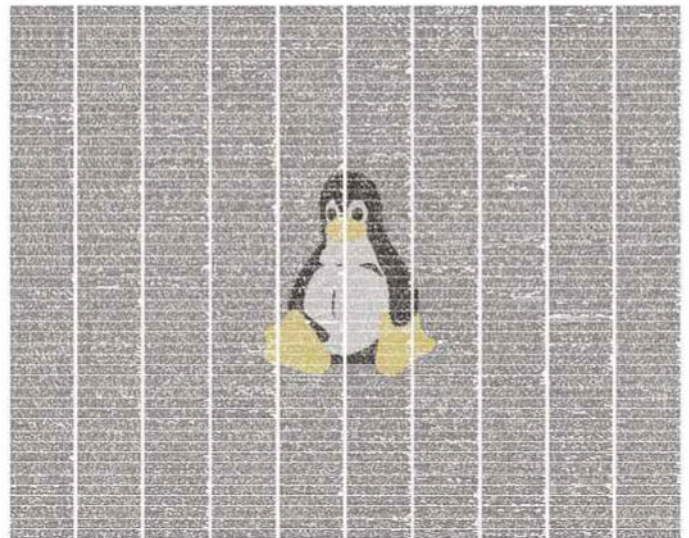
Furthermore, TRIM has been improved and can be forced enabled or disabled by the use, and EXT4 has been cleaned up with some extra bug fixes.

From a gaming point of view, the updated drivers certainly are welcome, but kernel 4.2 also offers support for the Sony Motion controller, Xbox Wireless controller and many touchscreen inputs.

with system firmware updates and much better functionality across a number of distros, most notably Fedora 23.

So, then, Linux 4.2 kernel is shaping up nicely, and this latest release candidate is one step closer to a more enjoyable Linux desktop in the very near future.

▼ **Kernel 4.2 is shaping up to be one of the biggest ever, with many enhancements**



To Affinity And Beyond

It's about time someone took on the might of Adobe, but Craig Grannell didn't think that someone would be Serif

When I first started using a Mac, it was a time of two giants taking chunks out of each other in the creative software space. Adobe and Macromedia went at it like two prize fighters in the ring, trading blows and battling for supremacy. Each had its main audience – Adobe in the print publishing sphere and Macromedia with new-fangled web design – but there was significant overlap, and each update of their major apps attempted to widen the net and snare more users.

Eventually, Adobe apparently had enough and bought Macromedia. Most Macromedia products were shuttered, and those that weren't (such as Dreamweaver and Flash) were consumed by the Adobe Borg and now lurk as part of Creative Cloud. And if you set foot in the creative industries, you'll know that, for the most part, Creative Cloud is pretty much all there is these days. (An exception is in publishing, which still has QuarkXPress positioned as something of a plucky underdog. And those of you with long memories who remember how things were before InDesign came along will probably have your head swimming at that particular thought.)

I hate to be too critical of Adobe, because it's clear the company has lots of decent people working there and also because the software is admittedly pretty good. Recent updates to Creative Cloud have been broadly impressive, and although there's a kind of 'Adobe OS' thing going on (rather than playing to each platform's individual strengths), anyone who can get past the interface will find plenty of power and

features to enjoy while creating all manner of books, illustrations, photos and websites.

However, it's also my belief that few companies excel in a monopoly. Everyone needs a good, solid kick up the backside now and again, to make them examine what they're doing, and ensure they're not just treading water. Photoshop hasn't had that in a very long time; in fact, perhaps it never really had that.

Of course, you might argue otherwise. And certainly, plenty of applications claim to be Photoshop rivals. Most notably on the Mac, Pixelmator (£22.99, pixelmator.com) has won plaudits and fans, largely through aping a version of Photoshop as it appeared perhaps a decade ago, and then clothing it in a somewhat cool (if actually awkward to use) smoky black, palette-heavy interface. At its best, though, Pixelmator is really a challenger for Photoshop Elements, not full-fledged Photoshop.

Affinity Photo (£39.99, affinity.serif.com/en-gb/photo) is different. Although it's an app that pretty much anyone can afford, it's not primarily aiming for the home-user crowd. Instead, it's chock full of features

and capabilities that pitch it directly in the same position as Photoshop. And for a version 1.0, it's quite astonishing. Given that the company behind it, Serif, is most known for cheapo PC image-editing suites, Affinity Photo is clearly a labour of love, built exclusively for Mac. The interface feels at home on OS X Yosemite, and it's efficient and friendly, despite its many palettes. In my time with Affinity Photo, the app feels like it could do what I usually rely on Photoshop for; more importantly, I've seen professional retouchers and other Photoshop advocates say the same thing.

Regardless of Affinity Photo's quality, it's going to be tough to convert anyone under Photoshop's spell. In image editing, Adobe's app is almost a 'standard', and the mesh Adobe's created with its products increasingly integrating is no accident. Outsiders aren't so much unwelcome as simply not being a cog already in the machine. But I love that Serif is trying – and not only that, but its app is ambitious, affordable, available without subscription and might make Adobe think differently – especially if enough people do switch.



▲ *Affinity Photo takes on Photoshop, which should give Adobe pause for thought. And it's only 40 quid too.*



Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find Craig on Twitter at @craiggrannell

Mac



Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

A Different Game

Ian McGurran looks at the latest of a new breed of games, now on tablets

There have always been games that offer an experience that's a little different to the usual videogame tropes. As far back as 1986 there was *Alter Ego* on the Commodore 64, a game where instead of shooting aliens or slaughtering orcs, you instead played out the everyday tribulations of a human being. It was still technically a game but was in the loosest sense. Playing it made you think and often reflect on your own decisions. With modern PC gaming, there are a growing number of independent games that continue this tradition, most notably 2012's *Walking Dead* series and more so in 2013's *Papers, Please*. Both games forced you to make hard decisions, often leaving you no choice but to do something you'd rather not, just like in real life.

Previously released on the PC platform, *This War of Mine* was hailed and spoken about in similar terms. In fact, due to its relationship with actual events, it has been said to carry even more emotional impact. The game is, at its heart, a survival adventure game with role-playing elements, though to look on it as this is to do its narrative gross disservice. You are the leader of a group of civilians caught up in a siege of war, heavily 'inspired' (if that's the right term) by the real four-year siege of Sarajevo in the 1990s. Your goal is survival until a ceasefire is reached. But because you're locked into a city under siege and crumbling inside from the ongoing conflict, it won't be easy or straightforward.

As it's a game, there are still the familiar aspects of this kind of title: you control several protagonists, you have to find things to survive and increase your chances of further survival,

and there's also combat, trading, decision making and more. The game veers between the relative safety of your bombed-out home and the nerve shredding experiences of having to go out at night and scavenge for items to survive the next day, be that food or items that can be used to make other things back at your home.

So far, so *Resident Evil* and, at its base, *This War of Mine* could be argued to be a videogame like many others. Graphically it's set in a graphic novel-style 2.5D parallax world, at once desolate, destroyed and beautiful too. The iPad certainly has little trouble handling it, and the touch interface lends itself well to the game.

But it's what you do and how you do it, coupled with the likelihood that what you've done or encountered has been experienced by someone in real life, that gives *This War of Mine* a harrowing realistic edge. Unlike many games that involve wars, here you are non-partisan, just someone caught in the middle of the conflict. That's not to say that the war is only outside the city walls; you'll still find snipers willing

to kill during the day, and those internal conflicts that categorised the Bosnian war are also felt here.

It's the times when you have Hobson's Choice that really bring it home, though, where no decision is the best one, just the one that ends up in your survival. Death is permanent here, so given the choice between trying to saving someone from a rape gang or instead running away because you'd almost certainly be killed doing so is horrible, and it's the kind of decision that stays with you, especially as it's something we hear about from war zones the world over – but here you're the one being forced to experience what it is to make that impossible decision.

To say *This War of Mine* is enjoyable is akin to calling *The Road* a fun read. That's not to say, like the book, the game should not be experienced. *This War of Mine* is a fantastic example of how modern videogames are able to convey emotion and storytelling like no other medium and is a fantastic riposte to those who believe games are *GTA* and *COD*.

THIS
WAR
OF
MINE

Mend And Make Do?

Andrew Unsworth is finding any excuse to complicate unnecessarily upgrade an old computer

Having been invigorated by breathing new life into an old laptop last month, I found myself window shopping on the net for a new processor and motherboard for an old PC. There's nothing wrong with that, of course. If the PC has a decent case with a good-quality power supply, SSD, RAM and so on, which it does, then there's no point wasting those components for the sake of two others. The problem is that there's nothing particularly wrong with the system I want to upgrade. The processor is an old AMD A6-3650, and the motherboard is an old micro-ATX Foxconn model.

The A6-3650 isn't the fastest processor, but it's paired with a Crucial M500 SSD and 8GB of RAM, so the PC feels snappy and very responsive, and it has no trouble playing games, running work applications or browsing the web. The motherboard is showing its age now, and some of the SATA ports have stopped working, so I'm down to my last two. Other problems include checksum failure every other boot and crashes on every first Windows boot. These things are annoying, but I'm pretty much just looking for an excuse to buy new gear, try a liquid cooler that I haven't used before (and that I'll have to mod my case slightly to use) and overclock a new CPU to an unnecessarily high clock speed.

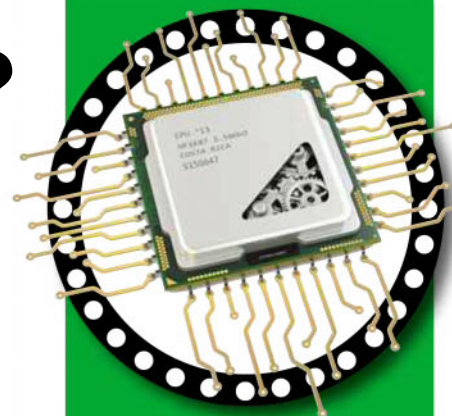
Scan Computers (www.scan.co.uk) is currently packaging the Core i5-4690K and the Core i7-4790K processors with the Asus Z97-P ATX motherboard for a few pounds less than it'd cost to buy them separately (£250 for

the Core i5-4690K bundle and £330 for the Core i7-4790K bundle). I'd already had my eye on the Z97-P, because it's a solid baseline motherboard that doesn't cost over the odds. As for the CPU, I naturally want to splash out on a Core i7, but it would be pointless, because I'd never use the top-end of its performance. I'd be much better off saving £80 and getting the Core i5, but I've always been a fool, and money is soon parted from me. I use an NZXT Kraken X61 in my main PC, and it's been good, so I fancy getting a Kraken X31. The PC case it'll go in doesn't have a specific mounting point for a radiator, so I'll have to remove at least one rear fan to install it, but that's all part of the fun. Then there's the memory, and I've somehow convinced myself

that I need 32GB of it to write articles and play on the internet.

The cost of this virtual shopping basket came to over £560, and it had only started off with me looking for a replacement for my PC's CPU and motherboard. The Core i5 and Asus Z97-P bundle would be a reasonable purchase, but as soon as I mentally resign myself to buy one set of components I start thinking ahead to the next upgrade, and before you know it I can't afford any of it. I think it's probably the same for all PC enthusiasts.

Still, my birthday is at the end of the year. Unless my motherboard packs in completely, I think I can hold off buying anything until then and simply drop some 'subtle' Christmas hints.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Hardware



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Old World Blues

Some web dwellers have moaned about *Fallout 4*'s visuals, but Bethesda says it's concentrating on scale rather than just "stunning" graphics

This week, Ryan checks out *Fallout 4*'s latest details, and takes a closer look at *Doom*'s multiplayer mode...

Plug & Play

QuakeCon may have sprung up as a celebration of id Software's seminal shooter, but it's long since grown to encompass a range of companies owned by the scarily expansive ZeniMax Media company. This is why one of the biggest games at this year's convention isn't an id game, but Bethesda's RPG sequel *Fallout 4*.

Understandably, there's a huge amount of anticipation surrounding this latest entry in the post-apocalyptic RPG series. Not only is it the first *Fallout* game since Obsidian's *New Vegas*, released in 2011, but it's also Bethesda's first release since *Skyrim* came out in 2010. It's safe to say that Bethesda hasn't rushed into following up its acclaimed *Fallout 3*, a title that managed to win over fans who were initially sceptical at the franchise's move from its isometric roots to a first-person, action RPG format.

The sequel Bethesda first unveiled at E3 back in June is one that evolves the mechanics and style of *Fallout 3* rather than overhauling it entirely; once again, the player emerges from a bunker to find the world outside devastated by war, where exploration, scavenging and sizeable dollops of intense combat are the order of the day. What intrigued us about

the first footage from *Fallout 4* was Bethesda's approach to its art style; rather than go for the kind of photo-realistic look some might have expected from a next-gen RPG, the studio's gone for a colourful, bold look that mixes high-res textures with stylised character models. Imagine a more downbeat, dusty version of *BioShock Infinite* and you're some way there.

Inevitably, *Fallout 4*'s style hasn't pleased everyone, as a quick look at the responses to the first footage proved. But the game's director Todd Howard responded to these criticism by arguing, quite rightly, that the game's focus should be on a "massive interactive world" rather than being "the most stunning RPG ever."

Speaking at QuakeCon, Howard spoke a bit more about the way his studio's using the power of modern PCs and consoles to improve the *Fallout* experience.

"Most games today have really good graphics - that's pretty standard," Howard said. "But memory's important to us. Because we can make a world that has more dynamic details that we can keep track of, and load quicker. All of that suspends your disbelief that this is a real world."

Running on a modified version of the Creation Engine, *Fallout 4* will not only expand the world of its predecessor with a much larger map, but also introduce a dozen potential companions for you to meet and, if you choose, fall in love with. Mr Handy, the robot Swiss army knife from earlier *Fallout* games, will also be making a return, and he'll be joined a loyal German Shepherd called Dogmeat. The dog promises to be a particularly useful ally in *Fallout*'s hostile world; you'll be able to command him to fetch and loot items, and he'll even help you keep smaller hostile creatures at bay while you stave them off with whatever weapons you have to hand.

So, while not everyone's been convinced by the visual approach Bethesda's taken with *Fallout 4*, the sheer scale of what it's attempting is ambitious to say the least. Its post-apocalyptic landscape may be bleak, but the future for the game itself looks bright. *Fallout 4* is out on 10th November.

Online

The other big game at this year's QuakeCon was, as you'll probably have guessed, an id Software title. We're talking about *Doom*, id's long-in-the-making follow-up to *Doom 3*, which celebrated its 10th birthday last year. Like



▲ The new Doom will be like "Bruce Lee with a shotgun on a skateboard," according to id Software. Makes perfect sense to us

Fallout 4, the new *Doom* got a grand unveiling at E3, where it showed off some generous slabs of its single-player and multiplayer gameplay. What we saw was slick, modern and unfeasibly gory, but also retro in terms of its sheer speed and simplicity: jumps are high and movement is fast, while enemies explode in great pinata-like showers of bonuses and other items when shot.

It's all a far cry from the earlier, infamously abandoned build of the game, an iteration famously dubbed "Call of Doom" by one insider. Instead, id has made a concerted attempt to return to the core of what made the *Doom* games massively popular in the 1990s – a frenetic style of shooting which art director Hugo Martin referred to at *QuakeCon* as "Bruce Lee with a shotgun on a skateboard."

That approach to a more aggressive kind of gameplay extends to *Doom's* multiplayer arenas, where it seems that speed and reactions are key.

"We wanted to focus on these traditional id roots," said producer Brad Bramlett according to *PC Gamer*. "When the game is fast and fluid, it's exactly what we wanted it to be, so there's no better feeling than that."

One of the most significant design choices id has made is in abandoning the regenerating health bars that have become a common sight in modern shooters. The reasoning, according to executive producer Marty Stratton, is to always keep players on the move and discourage them from finding safe refuges where they can hide and recharge their health.

"Movement is king, and you don't want players stopping to regenerate health, you want them moving forward to see the resources of the game," Stratton said. "That also leads to needing a lot of skill for players to get through the game."

The introduction of something called SnapMap could also be seen as a throwback to the *Doom* games of old. Just as WADs made it easy for players to modify and create their own maps in the earlier *Doom* games, so SnapMap will provide "a custom designed gateway to an endless stream of *Doom* experiences created by you."

With custom maps coupled to the kind of aggressive competition that defined *Quake's* multiplayer, *Doom* could be prove to be a perfect mix of old and new. Bethesda's announced that *Doom's* multiplayer alpha testing phase will begin over the next few months, with participants being selected from those who purchased *Wolfenstein: The New Order*.

The finished *Doom's* due for release in spring 2016.

Incoming

If you're planning to immerse yourself in the world of *Fallout* before the release of *Fallout 4* in November, there's good news. Bethesda's preparing to release a complete anthology of all the *Fallout* games so far, from Interplay's 1997 original to 2012's *Fallout New Vegas Ultimate Edition*. The five games are joined by all the add-ons which followed them, too, so if you missed *Fallout 3's* *The Pitt* or *Broken Steel*, or *New Vegas'* *Dead Money*, this is the chance to get your hands on all the DLC in one place. The anthology comes in an imposing bomb-shaped box, which Bethesda describes as an "exclusive mini-nuke storage case with audible bomb sound." If you haven't yet caught up with one of the best RPG series of all time, then the *Fallout Anthology* is a great place to start.

Fallout Anthology is out on 2nd October.



▲ Ahead of *Fallout 4*, there's *Fallout Anthology*, which collects all the earlier *Fallout* games and expansions in one bomb-shaped case

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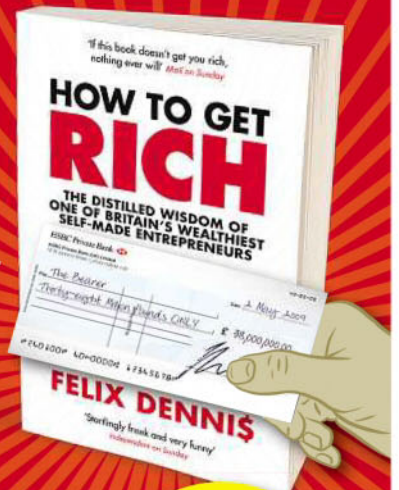
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Have you got any old kit lying around you'd like to get rid of? Fancy making a few pounds while you're at it? Why not advertise in the Micro Mart classifieds? It's easy and it's free, just email what you've got, how much you'd like for it, and your contact details to micromart-classifieds@gmail.com, and we'll do the rest. There are thousands of readers out there looking for components every week, and you may have something unwanted they've been searching for – so get in touch and save your kit from going to the tip!

Gigabyte Geforce GTX680. Model GV-N680D5-2GD-B, 2048MB RAM, PCIe x16, bare card, no box. £200 ono. Collection only from Wokingham RG41.
Tel: Bob Pratt (01189) 781753
Email: bob@docbobs.com

MOTHERBOARD + RAM + GRAPHIC CARD BUNDLE. Asus P5QL SE + OCZ 4Gb RAM + 1Gb Quadro PCI-E Graphic Card. SEE SEPARATE ADS FOR DETAIL. From my Windows 8 machine. BUNDLE: £105 Incl. Reg. P&P
Tel: Dave (01206) 298773
Email: ochdgh@aol.com

NVidia Quadro 600 GPU. 1GB DDR3, Dual link DVI-I + Display port. Max. Display at 60Hz + 2560x1600, Direct X 11, Open GL 4.4. The best performance per watt in its class. Big performance, small form factor, and small power consumption. Removed from my working Windows 8 machine. £32.50 incl. Reg. post.
Tel: Dave (01206) 298773
Email: ochdgh@aol.com

2 x 2GB OCZ Gold Series DDR2 RAM. PC2 8500, (matched pair) P/N OCZ2G10664GK 5-6-6 2.1v Removed from my working machine. £40 the pair incl. reg. post.
Tel: Dave (01206) 298773 Email: ochdgh@aol.com

Asus P5QL SE + OCZ 4Gb RAM + 1Gb Quadro PCI-E Graphic Card. SEE SEPARATE ADS FOR DETAIL. Removed from my Windows 8 machine. BUNDLE PRICE £105 Incl. Reg. P&P
Tel: Dave (01206) 298773
Email: ochdgh@aol.com

NVidia Quadro 600 GPU. 1GB DDR3, Dual link DVI-I + Display port. Max. Display at 60Hz + 2560x1600, Direct X 11, Open GL 4.4. The best graphics performance per watt in its class. Big performance, small form factor, and small power consumption. Removed from my working Win 8 machine. £32.50 incl. Reg. post.
Tel: Dave (01206) 298773
Email: ochdgh@aol.com

2 x 2GB OCZ Gold Series DDR2 RAM. PC2 8500, (matched pair) P/N OCZ2G10664GK 5-6-6 2.1v Removed from my working machine. £40 for the pair incl. reg. post.
Tel: Dave (01206) 298773
Email: ochdgh@aol.com

Asus P5QLSE ATX motherboard. LGA 775/Socket T, P43 chipset, DDR2 SDRAM, FSB 1600MHz. I/O Backplate + Driver Disk + User Guide. Rock solid board removed from my working machine. £39.50 to include reg. UK postage.
Tel: Dave (01206) 298773
Email: ochdgh@aol.com

NON ECC LOW DENSITY LAPTOP MEMORY MODULES. DOUBLE SIDED RAM. Working Laptop pull, Please double check as No returns due to incompatibility. 8GB 2 X 4GB Crucial 204 Pin SODIMM 512Mx64 DDR. CT51264BC1067.M16FD BV1111Z.FS 201106 SU £27.50 the pair incl. Reg. p&p
Tel: Dave (01206) 298773
Email: ochdgh@aol.com

Dell XPS12 Ultrabook. 4th gen i5, 4GB RAM, 128GB SSD 10 point touch 12.5" 1920 x 1080 Display, Backlit US Keyboard, Wireless-AC, Bluetooth, USB3. £395
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Dell Latitude E5420 i5. Very fast 2.5, 4GB RAM, 500GB HDD, DVDRW fantastic condition. Cheaper than any on Ebay. Very good battery life. You can collect from Manchester or Portsmouth or I can courier out to you next day for an extra £10. Please call all email for any questions. It has Windows 7 64 bit installed and activated with a genuine certificate of authenticity. NEW £125.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Compaq/HP nc6320 Laptop. Core 2 Duo 1.8mhz, 512 Ram, 80gb Hard drive DVDRW Win 7 Professional COA. Memory can be upgraded for an extra charge. Cheaper than any on Ebay. Very good battery life. You can collect from Manchester or Portsmouth or I can courier out to you next day for an extra £10. Please call all email for any questions. It has Windows 7 32 bit installed and activated with a genuine certificate of authenticity. Refurbished £60.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Dell D830 laptop. Core 2 Duo T8300 2.4mhz (very fast) 2gb ram 120GB HDD, DVDRW Genuine Win 7 pro 32-bit activated. Fantastic condition. Cheaper than any on Ebay. Very good battery life. You can collect from Manchester or Portsmouth or I can courier out to you next day for £10. Call/email with questions. Refurbished £80.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Compaq/HP 6910p Laptop. Core 2 Duo 1.8mhz, 2gb Ram, 160gb Hard drive DVDCDRW Win 7 Professional COA. Cheaper than any on Ebay. Very good battery life. You can collect from Manchester or Portsmouth or I can courier out to you next day for an extra £10. Call or email any questions. It has Win 7 32-bit installed and activated with a genuine COA. Refurbished £60.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Desktop PC. Zalman T3 case, 3.4Ghz CPU, Asus Motherboard, Seagate 500gb HDD, Samsung Optical drive. 4gb Kingston RAM Wifi & Ethernet, Genuine Windows 7 Ultimate. Collection preferred from Flintshire or willing to discuss options. £150.
Tel: Paul (07900) 796780
Email n-peckdd@5kid5.net

PC Desktop Ram (DIMM) Memory. Siemens PC100 - 222- 620 16M x 64 SDRAM. HYS64V16222GU-8 Only £8.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

27" iMac. 2.9 GHz Intel i5, 1TB HDD, 8GB RAM – late 2012 Model (thin edge) iMac in good condition, running OSX Yosemite. No keyboard or mouse. Supplied in original box. £700.
Tel: Chris Salter (01707) 880251
Email: ChrisSalter@hoarelea.com

ANTEC 2800 MIDI-TOWER.

Black Antec case, Sempron 2800+, Gigabyte m/board, 2GB RAM, 80GB Hard-Drive, DVD-RW, 10/100 Network. Clean install of Windows XP, Office 2007, fully updated & activated, all usual utilities, XP COA on case. £39 (P&P £15).
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

HP 88 Inkjet Cartridges eight time expired boxed HP cartridges £5.

Tel: Ian (01932) 856971
Email: a2345@btinternet.com

OPTERON 185 WORKSTATION.

2.6GHz Dual-Core, Freezer 64, 4GB RAM, 160 + 300GB, CD-RW, DVD-RW, Floppy, network Card, Soundblaster , NVidia , Vista Business, fully updated & activated, with copy of install media & working activation number. £79 (P&P £15).
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

WD 500GB external USB HDD.

Excellent Condition. £20 inc. P&P.
Tel: Michael Cunnane (01452) 303732

KINGSTON 120GB SOLID

STATE HARD DRIVE. For sale 120GB Kingston solid state hard drive model SSDnow V300 2.5" Sata3 - compatible with Sata2. Very fast drive. Perfect condition. Free delivery. PayPal accepted. Price £38.

Email: geofry@tiscali.co.uk

ASUS P5QL-EPU Motherboard

- 775 Socket - DDR2. Tested and removed from a working environment, comes with I/O Plate. £45 inc Free Courier. Payment via PayPal.

Email: info@jmcomputing.info

Laptop for sale. Dell Latitude

E5420 i5 2.5 ghz, 4GB RAM, 500GB hard drive, DVDRW, built in camera. Genuine Windows 7 64 bit professional. Only £150 plus £12 for next day delivery. Payment via Paypal or cheque or bank transfer, cash.

Fantastic condition very fast.

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Laptop for sale. HP NC 6400 Core

2 DUO 2.0MHz 3GB ram 80GB HDD, DVDCDRW Fingerprint reader, Fantastic and fast . Windows 7 32-bit professional. Only £60 plus £12 for next day delivery.

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Asus Z97 Gryphon Armor Kit.

Steel backplate with plastic top and auxilliary fan. Also some minor plastic bits. £20. Email for more details.

Email: graham_rocknell@yahoo.co.uk

Laptop for sale. HP Compaq

6910p Core 2 DUO T7300 2.0mhz 3gb ram 80gb hard drive DVDCDRW Fingerprint reader fantastic and fast , Genuine win 7 35 bit professional Only £60 plus £12 for next day delivery. Fantastic condition, very fast.

Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

PC Desktop Ram (DIMM)

Memory. 64MB Siemens PC100-322-620 MT8LSDT864AG-10CZ5. £8.

Tel: Gordon (01314) 660205

E-mail: scobieg09@gmail.com

WD 3TB internal Hard Drive.

Excellent Condition, £65 inc P&P.

Tel: Michael Cunnane (01452) 303732

WD Internal SATA 3.5" 2TB

Hard Drive. Excellent Condition. £37.50 included P&P. Flat screen monitors. Mainly 15" £20+p&p and 17" £30+p&p but have others on request. When packing I will make sure they have lot of padding to reduce rick of damage. Please email or call me for more information.

Tel: David (01616) 888119

Email: pcmadnessltd@yahoo.co.uk

IBM Thinkpad T30 laptop

for spares or repairs. Excellent condition, but does not bootup. Not sure why. Could be an easy fix or for parts/spares. £15 plus P&P.

Tel: Gordon (01314) 660205

E-mail: scobieg09@gmail.com

Webcam (Trust Spacecam).

Boxed with CD of installation software and instruction manual. Perfect condition. £10.

Tel: Gordon (01314) 660205

E-mail: scobieg09@gmail.com

For Sale: HP Photosmart C4585

All-in-One multifunction colour printer. Perfect condition. Includes software discs and manual. £20

Tel: Gordon (01314) 660205

E-mail: scobieg09@gmail.com

Western Digital Cavier SE

Desktop Hard Disk Drive 160GB. In Perfect condition. Only £10

Tel: Gordon (01314) 660205

E-mail: scobieg09@gmail.com

Netgear DG834N Rangemax

Next Wireless N Modem Router kit. Excellent condition complete with power supply, network cables, telephone cable, ADSL filter and setup CD. £10.

Tel: David Ewles (01295) 253554

Email: david@ewles.gb.com

Toshiba Portage i5 laptop.

2.5GHz Model R830-13c 4GB RAM, 320GB HDD. Wi-Fi, fingerprint scanner, HDMI ouput. Sold on eBay for over £200; only £150 plus £15 p&p. Bargain. Great condition. Very light.

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Seagate Barraucda 250GB

SATA Hard Drive 3.5". Tested and removed from a working environment. £12 inc Free Courier. Payment via PayPal.

Email: info@jmcomputing.info

LAPTOP HARD DRIVE. 160GB

SATA 2.5". WESTERN DIGITAL. Model: WD1600BEVT. Fully tested. Perfect working order. Partitioned and formatted NTFS. Free postage. Price £22. Paypal accepted.

Email: geofry@tiscali.co.uk

Asus A8V motherboard, socket 939. Clips holding CPU cooler broke, CPU overheated & shut down. M/B should be OK and there is 4GB of ram on board.

Free, collect only. North Wales.

Tel: (01286) 678584

Email: gw7hav@googlemail.com

DESKTOP HARD DRIVE.

640GB Western Digital 3.5" SATA model WD6400AAKS. Perfect working order. Partitioned and formatted. Only used as back-up drive. Free delivery. Price: £33.

PayPal accepted.

Email: geofry@tiscali.co.uk

4x 1 GB DDR2 RAM (Ocz Nvidia

SLI PC2 6400 epp 4-4-4-15) for Sale. £40.00 for all 4 + Post/Packing. In perfect working order.

Email: ken.toole1@virginmedia.com

Vintage Amstrad PC1512 HD20.

Colour Monitor 20MB Hard Drive 5.25 Floppy Original Amstrad Disks Manuals spare Keyboard and Mouse. This is a rare fully functioning collectable. £60.

Tel: (01949) 876235

Email: hc4203@gmail.com

4x 1GB DDR2 Ram (OCZ Nvidia

SLI PC2 6400 epp 4-4-4-15). £40.00 for all 4 + Post/Packing. Perfect working order.

Email: ken.toole1@virginmedia.com

Laptop Hard Disk Drive. Fujitsu.

20GB. Excellent condition: £10.00.

Tel: Gordon (01314) 660205

E-mail: scobieg09@gmail.com

XXFX GeForce Nvidia 8800Gts

Graphics Card For Sale. £40.00 + Post. In perfect working order

Email: ken.toole1@virginmedia.com

Corsair Vengeance 16GB (2x 8GB) DDR3 RAM

CMSX16GX3M2A1600C10. Never used. Selling due to wrong voltage, these are 1.5V and I needed 1.35V. Asking £85 inc. postage to the UK. Email: fabstock1@gmail.com

HP Microserver n40l / windows 7 Pro / 4GB RAM / 400GB drive / MS Office 2003. This HP n40l Microserver is in excellent condition and comes with Windows 7 re-allocated, activated & updated Feb 2015. Also installed is Minitools Partition Magic, MS Office 2003 HP basic, with codes/COAs. Buyer may have Linux Mint, or a completely bare drive. 2 spare drive frames. I have the original packing as per HP original delivery. So far as I can see, this Microserver will take 16GB memory and up to five drives. See it working before buying, (by arrangement). No refund under any circumstances. Collect from Harrogate, North Yorkshire. £140. Cash on collection. Delivery might cost £8 via Hermes, maybe much more to Highlands/Islands. Payment by Cheque OK subject to clearing, Paypal at £25 additional (to cover their fees). Tel: (07794) 528857 Email: it_central@ntlworld.com

CD Optical Drive for installation in desktop PC Only £10. Tel: Gordon (01314) 660205 Email: scobie09@gmail.com

Used Asus Wireless Router for sale. Dual-band 4 x GB Ethernet Wi-Fi RT-N66U N-900. £65.00 O.V.N.O. Selling cause I have no need for it since upgrade to BT Home Hub 5. Email: beme12355@googlemail.com

Intel Core 2 Duo E4400 2.0GHz £10, Intel P4 630 3.0GHz £7, Intel Celeron M 350 1.3GHz £5, Intel Celeron Mobile Dual core T1500 1.866Ghz £6, Intel Pentium 4 630 HT 3.0Ghz 2MB cache £8, AMD Athlon 64 3200 £5 Athlon 64 3500 £6 Athlon 64 3200 Dual core £10 postage £2. Tel: Jeremy Gill (02089) 430683 Email: arthur.pewty1@virgin.net

SKY PLUS and SKY PLUS HD REMOTES. Original £7.50 + P&P please email or call me for more information.

Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

US Robotics External 56K Message Modem. Includes V.90 56K Standard X2 Technology. Boxed and complete. Perfect. £25 + p&p. Tel: Gordon (01314) 660205 E-mail: scobie09@gmail.com

2 x 2GB DDR3 1600 MHz RAM. Recently taken from a 2012 mac mini. As new £25. Email amstereofan@gmail.com

Custom Built modified watercooled gaming desktop. i5 4670K, R9 280X, Silverstone RV-01 USB3, 1000W PSU: parachord sleeving, Z87M OC Formula, 8GB Kingston Fury 1866MHz, 180mm and 120mm Radiator. Yellow and Black colour scheme! No Storage. Email for pics and info. Buyer collect: Gloucestershire. £800 ono. Tel: Adam (07426) 874117 Email: flaming_monkey95@hotmail.co.uk

CPU sale. Intel Core 2 Duo E4400 2.0GHz £10, Intel Pentium 4 630 3.0GHz £7, Intel Celeron M 350 1.3GHz £5, Intel Celeron Mobile Dual core T1500 1.866Ghz £6, Intel Pentium 4 630 HT 3.0Ghz 2MB cache £8, AMD Athlon 64 3200 £5 Athlon 64 3500 £6 Athlon 64 3200 Dual core £10 postage £2. Tel: Jeremy Gill (02089) 430683 Email: arthur.pewty1@virgin.net

Kingston HyperX 2x2GB DDR2 1066MHz RAM. Tested and removed from a working environment. £45 inc Free Courier. Payment via PayPal. Email: info@jmccomputing.info
2x 512MB PC3200 DDR400. Two sticks were removed from working system. £5, plus £1 P&P. Tel: Alan (02084) 202322 Email: alan@asandco.co.uk

DDR2 memory sale.

2 x Nanua PC2 3700 256MB £6 pair, 2 x HP PC2 4200 256MB £7 pair, 4 x HP PC2 4200 512MB £10 pair or £18 for four. Tel: Jeremy Gill (02089) 430683 Email: arthur.pewty1@virgin.net

Asus M2N2-SLI Deluxe motherboard bundle. With AMD Athlon 64 4000 CPU, 4GB of Corsair RAM plus fan, backplate, manual and driver CD. £40 Email: david.white38@ntlworld.com

IBM/LENOVO SFF BASEUNIT. P4/ 2.8 H-T, 2GB RAM, 40GB Hard Drive, CD-Rom, 10/100 Network, sound, USB, Clean install XP-pro, fully updated, Office Suite, Anti-Virus, & all usual utilities, COA Licence Sticker & Install media, £25 Tel: Pat (07710) 348638 Email: pat4cars@aol.com

FUJITSU-SIEMENS MINITOWER. Pentium D 2.8 Dual-Core, 2GB RAM, 80GB Hard Drive, DVD-RW, Gigabit network, sound, Clean Install XP-pro, fully updated, Office suite, Anti-Virus & all usual Utilities, Legal COA sticker & System Image. £35 Tel: Pat (07710) 348638 Email: pat4cars@aol.com

DELL OPTIPLEX GX240 SFF. P4/1.6, 20GB hard Drive, 768MB RAM, CD-Rom, 10/100 network, Sound, Front USB, Clean install XP-pro, fully updated, works OK but slow by modern standards, £15. Tel: Pat (07710) 348638 Email: pat4cars@aol.com

56kb Fax Modem External. £10. Tel: Gordon (01314) 660205 Email: scobie09@gmail.com
LG Flatron W2246S 22" monitor with power and VGA leads. No dead pixels in very good condition. £50 Buyer Collects (Verwood, Dorset) Tel: (01202) 826057 Email: geoffandcynth@themailspot.com

2x 1GB PC2100-648. These two matched sticks were removed from one of my redundant systems. Plus one PC2700 (DDR 333Mhz) and one 512Mb PC3200 DDR400 stick. All for £5 plus £2 P&P. Tel: Alan (02084) 202322 Email: alan@asandco.co.uk

Very rare Viking IBM 16MB Dram Card (15109 66G5109) for Compaq, IBM Thinkpad, Etc Laptop Only £20 Tel: Gordon (01314) 660205 E-mail: scobie09@gmail.com

TP-Link 54Mbps 4-port Wireless G Router. Perfect, boxed. Model: TL-WR340G. £20 plus postage. Tel: Gordon (01314) 660205 E-mail: scobie09@gmail.com

Intel Core 2 Duo E4600 3GHz 775 Socket Processor. Tested and removed from a working environment. £10 inc Free Courier. Payment via PayPal. Email: info@jmccomputing.info

Addon Wireless LAN USB 2.0 54Mbps 802.11g Adaptor. Boxed w/ manual and software: £9. Tel: Gordon (01314) 660205 E-mail: scobie09@gmail.com

CD Stomper CD/DVD Labelling System: Software, Labels and Label Applicator. Boxed. Unused. £9. Tel: Gordon (01314) 660205 E-mail: scobie09@gmail.com

DIR-615 Wireless N Router. Boxed, brand new. £30. Tel: Gordon (01314) 660205 E-mail: scobie09@gmail.com

Laptop DDR2 memory sale. 2 Corsair Value Select 533mhz 1GB £18 pair, 2 Hynix 800mhz 2GB £26 pair, 2 Generic 533mhz 1GB £15 pair, 1 Generic 800mhz 1GB £10, 1 Nanua 666mhz 1GB £, 1 Samsung 666mhz 1GB £8. Postage included Tel: Jeremy Gill (02089) 430683 Email: arthur.pewty1@virgin.net

2x 120GB Maxtor DiamondPlus 9
Drives plus 1x 80GB DiamondPlus
10. Can be supplied with 2x plug-in
caddies. Reasonable offers please.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

HP Elitebook 8760w i7 2820QM @
2.2GHz 32GB RAM 750GB HDD
Quadro 4000M GPU. Only 2 small
marks on whole machine. Cost
£3500 when new. £900 ONO
Tel: (07772) 926632
Email: stedaley19@gmail.com

WD 2TB desktop HDD. Formatted
ready for an OS. Runs very nicely.
New laptop means desktop items
must go! £40 inc. tracked postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Toshiba C500D-B-11 laptop. Almost
new cost £279 will accept £150ono
Tel: (01217) 535324

Intel 3930K processor. Used, but
not overclocked. No box or fan.
£220 ono. Will ship to UK address.
Tel: Tim (01623) 624509
Email tim.stirland@btinternet.com.

Amstrad PcW 9256 in good
working order with software. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

Asus P8Z68-v LX socket 1155
motherboard. Original box 1/0
cover user guide driver disk fitted
core i3 2100 CPU 3-1GHz and 8GB
PC1300 memory. No fan. Working
fast and fine. £125 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

ASUS P5B Motherboard - 775
Socket - DDR2. Tested and removed
from a working environment,
comes with I/O Plate. £35 inc Free
Courier. Payment via PayPal.
Email: info@jmcomputing.info

SAMSUNG GALAXY Tab 3 for
sale. 2mths old, 8GB, wi-fi, £80 open
to offers. Willing to post at a charge.
Tel: Christine (01386) 831836

HARDWARE WANTED

**Trying to breathe life back
into an old machine? Why
not submit a wanted ad and
see if any of the thousands of
computer enthusiasts who read
the magazine each week have
what you're looking for?**

WANTED: PC Tower case (beige
colour if possible) to rehome an
Amiga A1200 vintage computer.
The Amiga motherboard is H
410mm x L 190mm (H 16" x L 7.5").
PSU not an issue but if available 250
watt more than enough.
Tel: Bill (07742) 061569 or
(02641) 769503.

**WANTED: Fractal Design Define
XL** full tower case. R1 (original
version) in black.
Tel: (01670) 860146
Email: mm@tectron.co.uk

**WANTED: Working Dot Matrix
Printer** in Good Condition.
Thanks!
Email: printer.20.odayly@
spamgourmet.com

WANTED: Acorn computer
either an A5000 or A7000. Also
book on teaching yourself binary.
Tel: (07817) 861011
Email: Johnhaviland73@gmail.com

SOFTWARE FOR SALE

**Do you have old software that
you simply don't use? Why not
advertise with us and see if anyone
else can make use of it - you may
well be surprised to find that
someone is looking for it!**

Adobe Photoshop Elements
and Premiere Elements 12
Full Version - Windows/Mac.
Original Boxed CD with unused
product key. £47.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

PCB design software 127 layers,
schematic entry, PCB entry, PCB

to Gerber file converter, output to
printer. £9.99
Tel: Nigel Wright (07967) 527693
Email: cresswellavenue@talktalk.net

**Cyberlink PowerDVD 12
Standard.** Runs under Windows
8, 7, Vista or XP. Original CD
with unused product key £7.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com
Microsoft Office 2013. Original
Software only £100.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Sim City 2000. Boxed and
original. Classic gaming. £15.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Norton Family Premier 2.0. Runs
under Windows 8, 7, Vista or XP,
Original Symantec unused
product key £15.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Nuance Omnipage 18. OCR for
Windows 8, 7, Vista or XP, Original
CD with unused product key £25.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Acronis True Image Home 2012.
Bootable CD. Application runs
under Windows 8, 7, Vista or XP.
Original Acronis CD with unused
product key £5.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

SOFTWARE WANTED

Wanted: I have a BCL 2.4g Wireless
Gaming Mouse, Model: RF0P77 (3v
7ma) but no Drivers. Can someone
help with a copy of the Original
Drivers for this Wireless Mouse>??
cliffordevans603@btinternet.com

Wanted: Driver disc for Toshiba
L30-11D PSL33E laptop. Laptop
useless without drivers but only
worth £40, so cannot pay a lot.
Tel: John Udall (01384) 824494
Email: john.udall@blueyonder.co.uk

IMPORTANT BUYING ADVICE

**We work very hard to
police our classified
ads, and make them
as secure as possible.
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your bit too and use the
following guidelines:**

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bank transfer or post out cash,
unless you know the trader
already, or are sure it is okay
to do so. Pay by cheque, Paypal,
Nochex etc wherever possible.

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methods if in doubt, get us
to check them out by mailing
editorial@micromart.co.uk

- Keep copies of all
correspondence

- When sending out goods, at
the least obtain a certificate of
posting from the Post Office

**If you are in any doubt,
feel free to send us a mail
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successful transactions
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Micro Mart
Dennis Publishing
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London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Coppertop

I'm an existing Talk Talk internet customer and I've just ordered one of its Fibre packages with a new 'Super Router' arriving any day now (can't wait).

However, I already have a 'super router' of my own – a Netgear DGND3700 N600 Dual band Gigabit item, and have been wondering if I needed to change to the new one at all.

We have a completely wired LAN network (inc. the TV) and only use wireless now and again, so I'm not interested in that, just the incoming and outgoing speeds into the house (which my children constantly complain about). I realise that there has been another wi-fi connection standard upgrade from 802.11n, but what I currently have is fine for us.

Do you think I need to actually change the router? I'm trying to avoid all that setting up, which can cause so much hassle (and I'm used to the Netgear login screen).

The other thing that is now bothering me is that I expected a man with a shovel to come and lay a cable from the road when we got fibre installed, but the set up blurb states that it is only a switch at the local cabinet, which an engineer uses to connect the fibre to the cabinet to the ordinary copper cable coming into the home.

So is this some sort of poor man's fibre set up, rather than the real-deal? It sounds like another upgrade – like when broadband was first introduced.

Although the two routers are different models, there's relatively little to separate them, and both have very similar feature sets. The DGND3700 N600 even has VDSL support, as it's a modified incarnation of the older WNDR3700, which lacked support for the copper-line tech. As such, it all comes down to your preference. As the Netgear model is perfectly fine for you, and suits your needs, I wouldn't worry too much, and leave things as they are. You shouldn't have any issues.

However, most ISPs won't provide support for third party hardware, so if you have any issues with your connection that involve the router, you'll probably get no official help, as TalkTalk won't support your Netgear. If you connect the new router, you'll get full support. This is really going to be the main difference.

As for your worries about the line. It sounds as though TalkTalk are using both fibre and copper lines. The fibre lines are installed from the exchange to the local street cabinets, and copper runs into the customer's house. The router they send (as well as your Netgear), supports VDSL (Very high bit-rate DSL). This tech allows speeds of up to around 52Mb/s using copper lines, which is faster than most ADSL, and even many cable connections. It's not only potentially fast, depending on local usage, traffic-shaping, etc, but it also makes it far easier to install into the majority of neighbourhoods without major roadworks and cost.

Kerry ▼ *TalkTalk, and many other ISPs, are using VDSL connections, merging fibre with copper*

The all new TalkTalk Super Router

Faster and smarter with even better coverage

Unbeatable
Wi-Fi
connection



Market leading signal strength

Our Super Router provides a stronger signal than BT, Virgin, Sky and EE so you can get wireless connection in areas where you couldn't previously get a connection.*



Fastest speeds in the UK

Out Of CTRL

My laptop's keyboard has seemingly stopped working, at least, working as it should. I first noticed the problem when I was trying to log in to Windows and my password wasn't correct. I tried again, and it was still wrong. I know I was typing it correctly, and then I noticed that not all characters were being typed. No matter what I tried, I couldn't get into Windows. I couldn't even get into the BIOS, as it seemed like the Del key wasn't working.

Luckily, I have a spare USB keyboard, which I plugged in, and somehow managed to get into Windows. I say somehow, because when I try to type in a text document, even the USB keyboard doesn't work properly. Some letters work, but others don't, and when I press certain letters, dialog boxes appear. For example, when I press P the print dialog box opens. When I press C or V, copy and paste seems to be triggered.

I've tried all sorts of things, including deleting the keyboard in Device Manager and updating the drivers,, but the problem remains. As it affects both the laptop keyboard and the USB keyboard, I'm worried it's a problem with Windows, and not the keyboard. I have noticed that the laptop keyboard seems to be much worse, however.

I'm really hoping you can help me with this, as my laptop is pretty much unusable at the moment, unless I have programs I can use solely with the mouse. It's an Acer V5-571 laptop running Windows 8. Thanks in advance for your help.

Margaret

Your description of the problem sounds like it could be a couple of different things, one that's easy to fix, and the other not so easy. I suspect the simple issue, which could still be the whole problem, is that your CTRL keys are locked – or you have 'Sticky Keys' set up. Of course, if the laptop have been dropped, or hit, or if liquid was spilled on it, this is most likely the issue. First check to see if any keys look stuck down, especially the CTRL keys. Tap them and see if any are sticky or unresponsive, lacking spring. If all is well, it's time to look at Windows causes like the CTRL lock or Sticky Keys.

To check the first possible cause, all you need to do is press both CTRL keys at the same time. Once you do this, try typing and see if the issue goes away. With luck, it will, as this is known to solve this issue. Alternatively, check that you don't have Sticky Keys activated. To check this, simply press Shift five times quickly. The Sticky Keys prompt should appear and you can deactivate it if needed. You can also find Sticky Keys in Control Panel. Navigate to 'Control Panel > Ease of Access > Ease of Access Center > Make the keyboard easier to use' and ensure Sticky Keys isn't turned on.

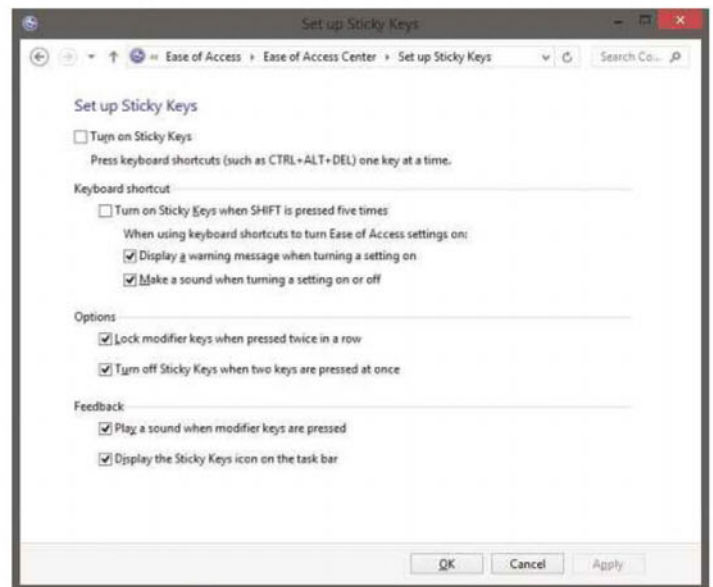
If this doesn't help, it may be something more serious, such as a damaged keyboard, or motherboard. This will be especially true if the USB keyboard responds to the above, but the laptop device doesn't.

Checking that isn't all that easy. If the USB keyboard works, but the laptop one doesn't, then it's pretty safe to assume something is wrong, but to really check, you'll need to open up the laptop and have a look at the basics. This should only be done if you're not going to void any warranty, though, and if you're confident you can open the unit up safely.

The Acer V5-571, like many laptops, has a keyboard that can be simply lifted up from the main chassis by gently forcing it up just above the function keys, but first you need to remove two screws from the underside (see the image on this page). Also, remove the battery and unplug the AC adapter to ensure no power is being provided to the system. Once this is done, gently lift the keyboard up and check the ribbon cable is secure in the connector. If it's not (and wasn't disturbed by you when removing the keyboard), this could explain a lot of things, so put it back and slide the connector lock back down.

Also check that there's no dust on the connector, and make sure the ribbon cable isn't damaged (it'll usually be bent in half, this is normal). Have a quick look at the keyboard and look for damage. This may not be apparent, but it's worth checking. If the laptop has been dropped, there may be damage inside the keyboard, or even the motherboard. Replacements and professional repairs can be expensive, though, so if the USB keyboard works, you may want to stick with this if you don't mind. As it's a laptop, though, this method hardly makes it portable.

The most straightforward fix could simply be to return the system if it's under warranty for a replacement. If not, try a visit to your local computer repair shops and get some quotes for the best prices.



▲ Sticky Keys can cause all sorts of keyboard input issues if it's turned on without you knowing



▲ Two screws need to be removed from the underside of the Acer V5-571 before the keyboard can be removed



Gently pry the keyboard up from the unit using a thin screwdriver or other tool, and then slowly lift it up

ASK JASON



Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
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Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

An Open-And-Shut Case?

I'm an enthusiastic amateur photographer, and I spend a lot of time manipulating my images in the likes of Photoshop. Both of my PCs are beginning to struggle, though. Both have 8GB of RAM, the most their motherboards will take, but once I have a few layers and adjustments going on, this soon becomes maxed out. I get slow-downs and crashes.

I was therefore interested to read Micro Mart's recent group test on gaming PCs. Such systems seem to have the necessary power that photo-editing programs are beginning to require.

However, would I be right in assuming that the ideal specification of a photo-editing system is subtly different? For instance, is raw speed less important than RAM? Rather than a Core i7 with 8GB, I'm considering an AMD A10 with 16GB – would this be a suitable way to go?

David Price, Virgin Media

RAM is king, for sure. I'm surprised you're running into trouble with 8GB, though, especially as you're not a heavy-hitter. Some professional photographers I know are getting by with even less. Could your PC be suffering from a different problem? Still, you're absolutely correct – 16GB would give you so much more headroom.

Don't skimp on CPU performance, however. It's no good being able to hold tons of image data in RAM if the CPU takes a fortnight to apply any changes. A Core i7 is ideal – quad-core with Hyper-Threading. Cheaper but still effective would be a Core i5 – quad-core without Hyper-Threading.

*What about the A10s? Well, I know these are the flagships in AMD's APU series, but they're still only mid-range, Dave. * Slide your eyes over this review at Tom's Hardware: goo.gl/xnThml. Broadly, the A10-7850K (3.7GHz, quad-core (if you believe the marketing)) is on a par with the Core i3-4330 (3.5GHz, dual-core with Hyper-Threading). It's barely half as fast as the Core*

i5-4670K (3.4GHz, quad-core without Hyper-Threading). † The Core i7s are so far ahead of the A10s that one hasn't even been included.

AMD's APUs are great for general use – especially for anyone wanting to indulge in casual gaming, as the built-in GPUs are often up to snuff for that – but they're a poor choice for a Photoshop setup. Of course, Core i5s and i7s cost a fair wedge more, so it's not that the A10s are overpriced. In this instance, though, you do get what you pay for. Saving money here would be a false economy.

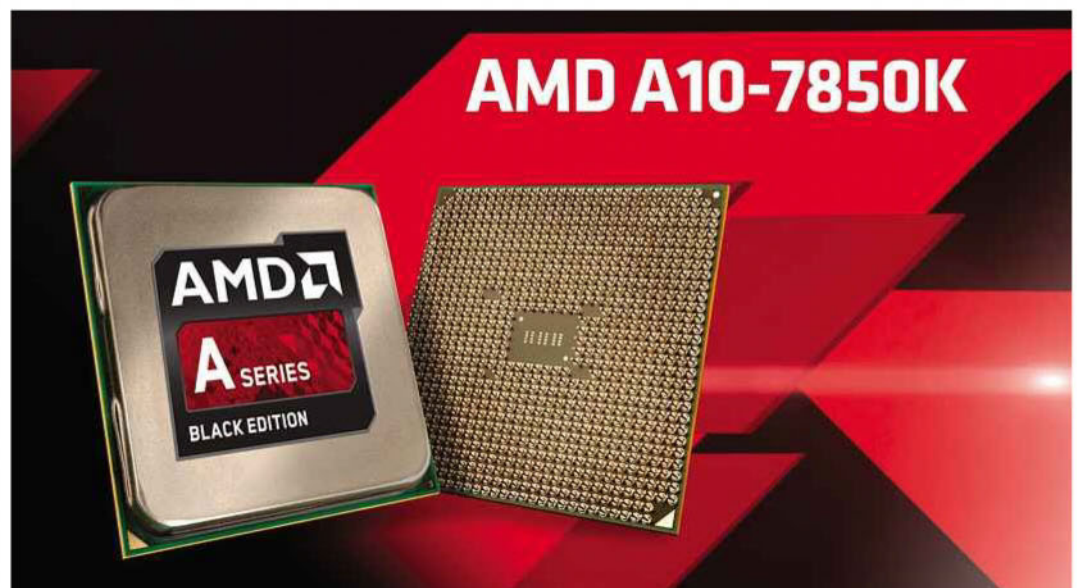
Also, it used to be true that graphics-card performance was almost irrelevant when it came to Photoshop. As long as colour accuracy was good (Matrox cards were top of the tree back in the day), any old card would do. Now, however, Photoshop can use OpenGL and OpenCL to undertake a fair few operations on the GPU instead of on the CPU, often with a speed boost of several thousand percent.

Only newer GPUs can do this, and such factors as the card's memory bandwidth also come into play. A good gaming card can now make a good Photoshop card, but for different reasons. It's not necessary to spend a fortune, Dave, but some research would be wise. Have a read of the following Adobe help page: goo.gl/itpQxH. A photographer going by the name of Roberto Blake has some useful advice too: goo.gl/vkYa3c.

** Of course, AMD also produces the FX series (ostensibly the flagship series). However, the company has lost interest, and no new models have appeared for ages (rumours suggest this may finally change). Performance has never been competitive. Avoid.*

† Wrongly labelled as the Core i5-4760K in the benchmarks (no such CPU exists).

Are AMD's APUs any good for Photoshop?



¡Viva La Resolución!

I took some videos on my phone when I was on holiday recently and I'm trying to capture some stills from them. I can't figure out how to do it, though. Apparently it's possible with Windows Movie Maker, but all this seems to have is the Snapshot feature. This certainly captures stills, but the resolution is that of the preview window, not of the original video. I'm therefore getting images that are only 458 × 258, not 1,920 × 1,080 (1080p HD). Pretty poor. Even if I expand the preview window, the resolution is still greatly reduced. What am I doing wrong?

Doug, Gmail

What you're doing wrong, I think, is using Windows Movie Maker. You'd think that grabbing stills from a video would be much easier than it is, and I'm surprised it's not a standard feature of most playback software. I believe full-resolution grabs were possible on earlier versions of Movie Maker – there are tutorials out there that suggest so – but this function seems to have been revoked on later versions (along with several other functions).

The tool I use, Doug, is GOM Player: goo.gl/JlxgMJ. ‡ This is a full-blown playback app, but I prefer VLC for that (goo.gl/UPSMY5). Anyway, fire GOM up, click the open-file icon (bottom-right), and select your video. It'll start playing automatically. Using the playback controls (bottom-left), whizz roughly to the right spot then pause on the desired frame. Lastly, click the camera icon (bottom-right) – the one with the tooltip reading 'Save the Current Frame'.

That's it! The frame will be saved at the video's native resolution (1080p in your case), even if you're playing the video at a lower resolution. The default storage location is C:\Users\[Username]\My Documents\GomPlayer\Capture, but you can change this via the program's settings if you want.

‡ If you'd like to know what GOM stands for, and why a bear's paw is the logo, head to this Wikipedia page: goo.gl/U3io9T. Go on. You know you want to.

▼ To grab full-resolution stills from a video, you need GOM Player (and, yes, the Scorpions were sensational)



Installation Frustration?

I'm about to pull the trigger on the free upgrade to Windows 10 – I'm currently on Windows 7. What happens, though, if the upgrade goes wrong (as it has for quite a few people, it seems!) or if I need to reinstall at some point down the road? Will I need to reinstall Windows 7 first and then go through the upgrade process again? I can't see any other way, as no-one upgrading for free will have a Windows 10 setup DVD or product key. What happens if I need to reinstall after a year, when the free upgrades have stopped being offered?

M. Edwards, Kent

Fear not, my friend. Microsoft has foreseen such circumstances and allows users to download Windows 10 setup files. Head to goo.gl/hhcSkZ. First off, get hold of the media-creation tool. Choose the appropriate flavour for the PC you're using for the download – 32-bit or 64-bit. Note that this choice doesn't affect which versions of the OS are made available. You'll still be able to download 64-bit setup files, for instance, even if you're using the 32-bit media-creation tool.

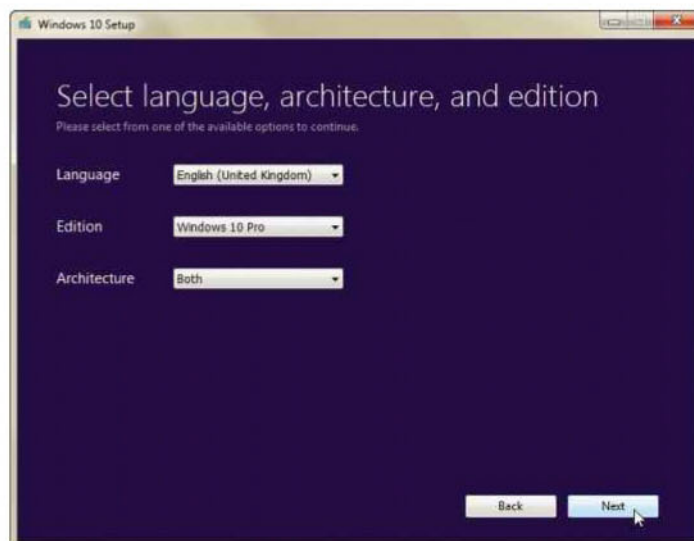
Run the tool when it's downloaded and work through the steps. Choose whether you want Home or Pro and 32-bit or 64-bit (or both). You can download either an ISO to burn to a DVD later or files to put on a USB stick right now. The DVD option is tricky, as you'll need a dual-layer disc (how many of us have one of those?). The USB option is best – the stick needs to be at least 8GB in size (only 6GB is required, but of course 6GB sticks don't exist). All current content will be wiped.

No Windows 10 product key is necessary in order to download, but you'll need one in order to install and activate (not so for users who buy a system with Windows 10 pre-installed). You'll only have

this if you've gone through the upgrade process at least once, so you can't skip this stage and jump straight to a clean installation. To retrieve your key, run a tool such as the Magical Jelly Bean Keyfinder (goo.gl/laObhU) or Belarc Advisor (goo.gl/vxmT4b). And do it sooner rather than later and write it down – you never know when you might need it.

PS – For further advice on the above, have a read of the following thread on the Micro Mart forum: goo.gl/HIIR9L.

▼ Thankfully, and somewhat surprisingly, Microsoft has made it easy for us to get hold of Windows 10 installation files



Crowdfunding Corner

Sometimes crowdfunding isn't just about getting new gadgets – it's also about turning your existing ones into something new and interesting. This week, a pair of Kickstarter projects designed to do just that

JoyDrone

Chromecast's ability to stream video from your browser or phone directly to a TV has made it an essential piece of hardware in many homes. Unfortunately, with only an HDMI-out port, it's unable to stream music directly to audio hardware in the same way. Unless, that is, you get a JoyDrone.

By converting the HDMI-out port on a Chromecast to a 3.5mm audio-out jack, the JoyDrone allows you to use Chromecast's networking abilities to stream music directly to any audio device. It continues to support all the features of Chromecast, so you can connect multiple devices to it and stream from a huge variety of online and offline sources.

No longer will you have to rely on a slow-to-connect and intermittent Bluetooth connection to stream music – you can essentially convert any speakers into wi-fi enabled speakers.

The project's extremely modest \$500 (£320) goal has been reached already, but – at least at the time of writing – you can still buy a JoyDrone for just \$17 (£11), with discounts available if you buy in multiples. Devices are shipping worldwide in September 2015 so there isn't even long to wait, and if you haven't got a Chromecast already you can pick one up from Amazon for just £29, which means the whole enterprise is still a lot cheaper than buying a single pair of wifi-enabled speakers. You can't say fairer than that, to be honest.

URL: kck.st/10Piyeq

Funding Ends: Monday, August 17th 2015

TRUS iUSB Expansion Drive

One of the more frustrating things about smartphones and tablets – particularly those made by Apple – is their lack of support for external storage. The trend is even filtering over to Android devices, unfortunately, with microSD support becoming progressively less common than it was. This is something the TRUS iUSB extender hopes to solve.

Essentially, the TRUS iUSB is a USB flash drive for your phone or tablet. The Apple-compatible Lightning version comes in several iterations – 16GB, 32GB, 64GB and 128GB – while the Android version comes in 32GB only. Both work with standard software, so you can use any compatible app to access the storage area. It's ideal if you want to expand your storage without paying through the nose for more advanced hardware, and better yet, it allows you to share large files between devices very quickly.

The cheapest models – the 16GB Apple versions – can be picked up for as little as €25 (£18) if you make it in time to take advantage of the early bird offer, or €30 (£21) if you don't. At the other end of the scale, the most expensive drive – the 128GB model – comes for €120 (£85) on a limited offer for the first 100 units. Every other variation falls between those two price points, and the €10,000 (£7,000) goal looks sure to be hit before the campaign's end, so if you like the look of this there's no better time to back it.

URL: kck.st/119rTcki

Funding Ends: Thursday, August 27th 2015



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

Retrospecs

David Hayward puts his rose-tinted retro glasses back on for another great app

We like retro stuff. The games, the computers, the consoles, the magazines and especially the graphics from this innocent era of our childhood. Those blocky 8-bit and 16-bit characters that despite only being made up of seemingly random chunks of code, actually ended up looking like the thing they were designed to represent.

As we often write about retro themed events, games and so on, we attempt to tackle the images that come along with the content. The images in question are usually rendered at the highest possible number of pixels, in resolutions that number in the thousands. While this is perfectly fine for

our modern HD lifestyle, when the content is regarding something from 30-odd years ago, it would be nice to have a similar themed representation.

In these instances, we'd hit Photoshop and try to fathom its inner workings – not always the easiest of tasks. However, there appears to be a light at the end of this particular tunnel in the form of an app called Retrospecs.

8-bit Art

Retrospecs is the creation of John Parker, a rather clever chap who obviously spent as much of his youth in front of a Spectrum (or something similar) as we have.

It's a simple enough app but one that has been lovingly coded and devised for ease of use while still offering a splendid retro themed output. All you need do is take a photograph or use one from your own gallery, and open it with the Retrospecs app. Then you can apply any one of a number of emulations built into the app and save the image, before tweaking it further with various filters and other image manipulation devices.

The emulation possibilities include Teletext, Apple II, Atari 2600, Commodore

PET, Intellivision, ZX Spectrum, Commodore 64, Thomson T07, Sinclair QL, Atari ST, Amiga, BBC Micros and many more – well over 40 in fact.

Beyond the system emulated, you can specify the resolution, the number of colours, dither, low light compensation filters, vibrancy boost and crop the image. And of course, once it's saved you'll be able to update your Facebook or Twitter pages with your new retro image that you've lovingly crafted from within the app.

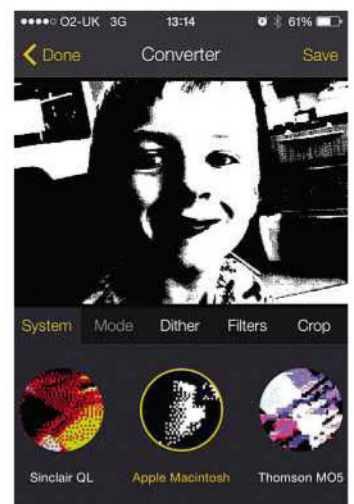
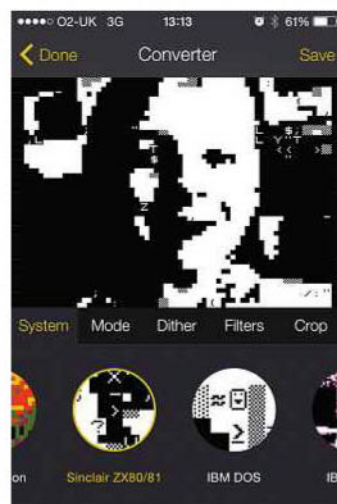
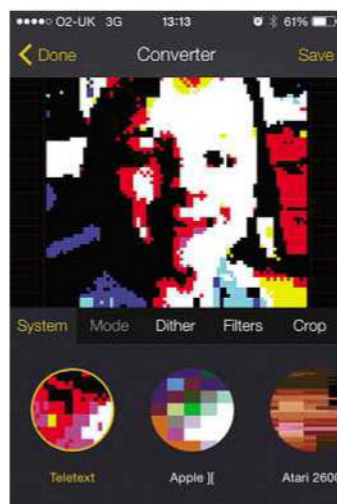
Conclusion

Retrospecs is an amazing and truly wonderful photo and image manipulation app. It's currently only available for iOS devices, priced at just £1.49 (goo.gl/8vFzKp), but we think that with some extra encouragement and a few readers buying into Retrospecs, we could persuade John to knock out an Android version.

If you fancy tweaking your images with something a little different and, like us, you have a love of technology from the 80s and 90s, then we highly recommend you get hold of Retrospecs and start retro-fying your gallery.

Features At A Glance

- Low cost: only £1.49.
- Render you photos from a collection of systems from the 80s and 90s.
- Tweak the images, resolution and colours to your own tastes.
- Nicely developed app, easy to use with great results.



Logging Off

In the past few years, through the market-shaping innovation of the iPod, iPhone and iPad, Apple has grown to become one of the most profitable companies on the planet. It's riding high on a mountainous cash pile, and the sort of margins that make others envious. It's become, however, a deeply paranoid business that doesn't like negative talk surrounding the company or stock.

This can prove to be very problematic when a flagship product release doesn't turn the sorts of incredible numbers it

wants. The Apple Watch is a perfect example: unlike the iPhone, this isn't an item about which it is shouting sales numbers from rooftops.

So how many has it sold? Apple won't say. No, seriously; in a Wall Street investor meeting CEO, Tim Cook had the temerity to tell those holding large amounts of stock in his company that "We made a decision back to September not to disclose the shipments of the watch," followed by the rather shabby line, "That was not a matter of not being transparent. It was a matter of not giving our competition insight on a product we've worked hard on." Really?

How about an alternative angle, Tim? Maybe other Smartphone accessory makers know that this market is remarkably weak on the basis of how their own products are shifting, and with you not releasing sales numbers, they now know it's not just them.

To muddy the water further, Apple lumped the Watch financials in with those of the iPod, Beats and Apple TV, with the whole collection generating \$2.6bn in revenue. If you assume, as you might reasonably do, that the other three are at best flat and two of them probably in decline, then Watch represents a reasonable portion of that money.

The people who still smoke and have fag packets to work with have calculated that those numbers to indicate a 2.5-3 million unit sales since launch. To put that in perspective, though, in the last three months to June Apple shifted 47.5 million iPhones and 11 million iPads. So it's little wonder Tim doesn't want to talk specifics on the Watch.

Apple isn't unique in its coyness, most tech industry companies have a carpet handy to brush things under when they become embarrassing. Intel, for instance, has never admitted what a complete fiasco Itanium was; Microsoft has never come clean about sales of Windows 8.x or Surface, and Nintendo has convulsions if

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anyone mentions Wii U sales numbers.

This causes major headaches for investors, because they're the ones directing large sums of money towards companies that can seemingly be frugal with the truth when it comes to financial success or failure.

I say that on the back of events at Toshiba, a company recently caught lying about its profitability, and which has had to explain to its investors that it overstated its profitability by a cool \$1.2 billion over seven years. From the perspective of tech companies, they often don't want a product to be perceived to have failed before it really has. Though, in many of these instances, it is also about senior people appearing to have made poor choices and not understanding the market they operate in. The truth eventually leaks out, however; if the Apple Watch is really 'exceeding expectations' then a new largely unchanged model will appear, and if it isn't then a major revamp or it's quiet withdrawal is on the cards.

Mark Dickavance

LAST WEEK'S CROSSWORD

Across: 1 Nova, 3 Heimdall, 9 Barking, 10 Susan, 11 Laissez-Faire, 13 USGCRP, 15 Divali, 17 Disambiguate, 20 Mufti, 21 Yuppies, 22 Tenantry, 23 Rate.

Down: 1 Nebulous, 2 Verdi, 4 El Giza, 5 Messaging API, 6 Austria, 7 Link, 8 Dissertation, 12 Licensee, 14 Griffon, 16 Ebuyer, 18 Amiga, 19 Omit.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. We're writing this in a hurry as we try to make up for time lost listening to Test Match Special when we should be putting the magazine together. Cries of 'GOAL' have been echoing around the shed for the last couple of days, as we demonstrate both the jingoistic support we like to offer to any of our national (though England, at least in cricketing terms, seems to translate into 'any player we can find

that will come and play for us, just ignore the accent) teams that are winning, and also our almost total lack of knowledge regarding what's actually happening on the field. That lack of sporting nous is, perhaps, best exemplified by John, who still gets ribbed over his decision not to attend the final day of the 2005 Edgbaston test, despite having a ticket - so convinced was he that it wouldn't be worth the effort. Look it up on YouTube if you want to marvel at how stupid that decision was. Still, the team in white won again and everybody - even Geoffrey Boycott, who we believe used to be quite good at the game, but is now professionally grumpy - seemed happy. So we're happy too. Trouble is, we've now got to get our googlies in gear and finish off the magazine too. It's really hard to type in fancy dress with a pint in your hand, y'know.

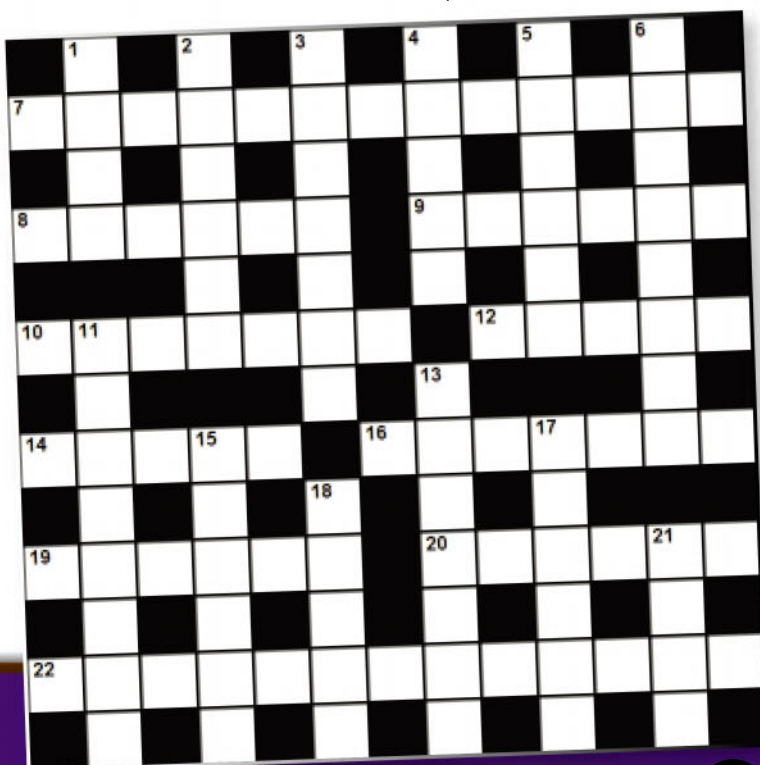
THIS WEEK'S CROSSWORD

Across

- 7** An ordered reference standard for describing the intensity and effects of an earthquake. (8,5)
8 A small set of core vocabulary terms that can be used to describe web resources - video, images, web pages, etc. (6)
9 Any of the three Greek goddesses of fate or destiny; identified with the Roman Parcae and similar to the Norse Norns. (6)
10 A colourless oily liquid; the monomer for polystyrene. (7)
12 Users mourned the loss of this button in Windows 8. (5)
14 A unit of quantum information, stored in a two-state quantum system. (5)
16 An instruction or signal causing a computer to perform one of its basic functions. (7)
19 Go through the procedures to conclude the use of a computer, database, or system account. (3,3)
20 An extra or repeated performance; usually given in response to audience demand. (6)
22 Someone who studies the science of communications and automatic control systems in both machines and living things. (13)

Down

- 1** .pe TLD (4)
2 Of or connected with the eyes or vision. (6)
3 An amino acid used to analyze quantum state decay. (7)
4 A large naturally occurring community of flora and fauna occupying a major habitat. (5)
5 In computing an automated series of instructions carried out in a specific order. (6)
6 Originally known as Chun Yun Electronics this Taiwanese company manufactures peripherals for consumers and high end graphics cards. (8)
11 A scientific name in which the same word is used for both genus and species. (8)
13 Dutch theoretical physicist who worked on the forces affecting electrons and realized that electrons and cathode rays were the same thing. (7)
15 Each of two or more atomic nuclei that have the same atomic number and the same mass number but different energy states. (6)
17 A container for storing food resembling a basket made from birchbark. (6)
18 Very few - maybe none. (2,3)
21 A strategy board game produced by Parker Brothers originally released in France in 1957 as La Conquête du Monde. (4)



Top 5

Terrible Things Of The Digital Age

Sometimes even we long for a simpler time

1 Trolling

Before we had the internet, if you wanted to casually insult someone, you had to do it in person or over the phone. Nowadays, of course, you just head onto an internet forum or social network and abuse people as much as you like – all without the burden of being identifiable. Predictably, this anonymity brings out the worst in many people and has led to the phenomenon known as trolling, which before the internet came along, would just have been known as being a really, really terrible human being.

2 User Comments

In the good old days, when someone wanted to make a complaint about a newspaper or magazine article, they would have had to write an actual letter, with pen and paper. That took effort and ensured that people had time to consider what they were saying. In the age of the blog, it's far easier to just spout vitriol and abuse, without a second thought. And unlike trolling, some of the worst abuse you find in user comments is from people who genuinely believe they're right and, more importantly, that everyone else is wrong. No wonder *Popular Science* and a few other sites decided to turn off comments completely.

3 Text Talk

Whether people are being nice or nasty, we personally prefer it when they write in actual words, rather than saying they 'h8' us or writing 'lol' in response to our jokes. We're not saying we've never used text talk before, but that was back when typing a letter 'i' on a phone meant tapping the 4 key three times. These days, it's easy to write full words, and voice dictation means you don't even have to type. So there's really no excuse for text talk. Agreed? Gr8.

4 Selfies

Were folk always as self absorbed as they are today? We can still remember when people took pictures of things, people or places they liked or found interesting, rather than just constantly snapping themselves. Before we had social

networks and digital cameras, narcissists would have got their 'me' fix by simply looking in a mirror, but nowadays they not only have the ability to take limitless photos of themselves, but they also get to force their pictures on everyone else via Facebook.

5 Selfie Sticks

If you look at the design of the human body, you have to applaud the engineering and design, but it's not without its flaws. Chief among these, of course, is the shortness of our arms, which sometimes makes it difficult to get a really good picture of yourself when you're eating your breakfast, waiting for a train, buying some shoes or whatever. Thankfully, some genius gave us selfie sticks, so now you can satisfy your vanity no matter where you are, without having to hand your phone over to someone else to photograph you. Who cares if you look like a walking satellite dish when you use it?



▲ Selfie sticks: proof positive that the human race is doomed

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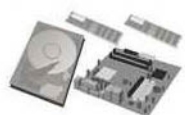


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